AVIATION WEEK

A McGRAW-HILL PUBLICATION

MAY, 31, 1954

50 CENTS

It takes two kinds of care to make a gyro right

THE care it takes to make a better gyro comes in two varieties.

One is the visible kind.

You see plenty of that in the photos of the Honeywell gyro operation shown here. It's hard to over-stress its importance when the quality of such a delicate mechanism is at stake.

Another is the kind you *can't* see.

This includes such things as rigid control of temperature, humidity and purity of air in all our gyro rooms. It most certainly includes the unexcelled training of our engineers and production workers. The thoroughness of our design, development and production methods is also of significant importance.

Both kinds of care have helped Honeywell become the nation's leading producer of precision gyros. The complete Honeywell gyro line includes the Cageable Vertical Gyro, and many other Vertical and Rate Gyros—including the Hermetic Integrating Gyro, the world's most sensitive.

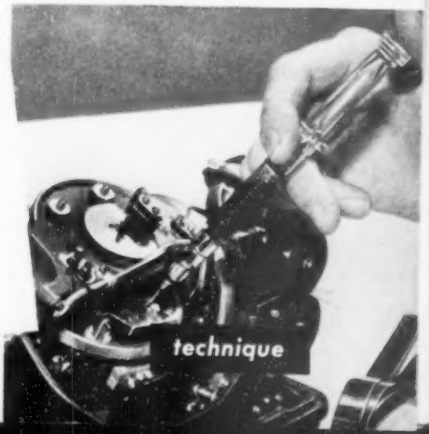
The Honeywell gyro line is but a part of our complete line of airborne controls. This line is continually expanding, as we make new discoveries and learn of new needs. Automatic control is important to aviation's progress, and *automatic control* is Honeywell's business.

MINNEAPOLIS

Honeywell

Aeronautical Division

2600 Ridgway Road, Minneapolis 13, Minnesota



What's so **DIFFERENT**

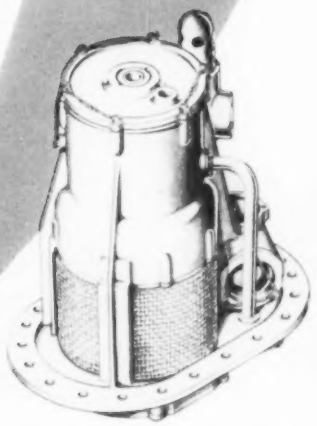
about **HY-V/L** * Fuel Booster Pumps ?

It's not the pump—it's the principle!

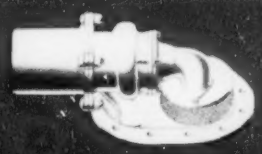
Other fuel booster pumps attempt to separate the vapor from boiling fuel. The HY-V/L principle, developed by Hydro-Aire, is to take both vapor and liquid together and condense the vapor back into the liquid *inside the pump.*

In other words, the HY-V/L Pump is more efficient. It saves the extra power needed to drive a separator.

That is why, in tests sea-level to 70,000 feet, the HY-V/L pumps more fuel at more pressure with less power consumption. HY-V/L Pumps have been tested at rates of climb far in excess of aircraft performance for years to come. In addition, HY-V/L Pumps have the power of immediate recovery both after temporary power failure and after being completely uncovered at the inlet.



High Capacity A.C. Electric Motor Driven Submerged Fuel Booster Pump. Output: 40,000 lb. per hour at 14 psig discharge pressure.



Submerged D.C. Electric Motor Driven tank mounted Fuel Booster Pump. This Pump will deliver 6,000 lb. per hour of Aviation Fuel at 4 psig discharge pressure.

Submerged A.C. Electric Motor Driven Fuel Booster Pump. Supplies 20,000 lb. per hour of Aviation Fuel at 6 psig discharge pressure.

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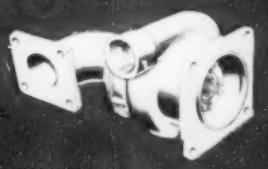
3000 WINONA AVENUE, BURBANK, CALIF.
Subsidiary of Crane Co.

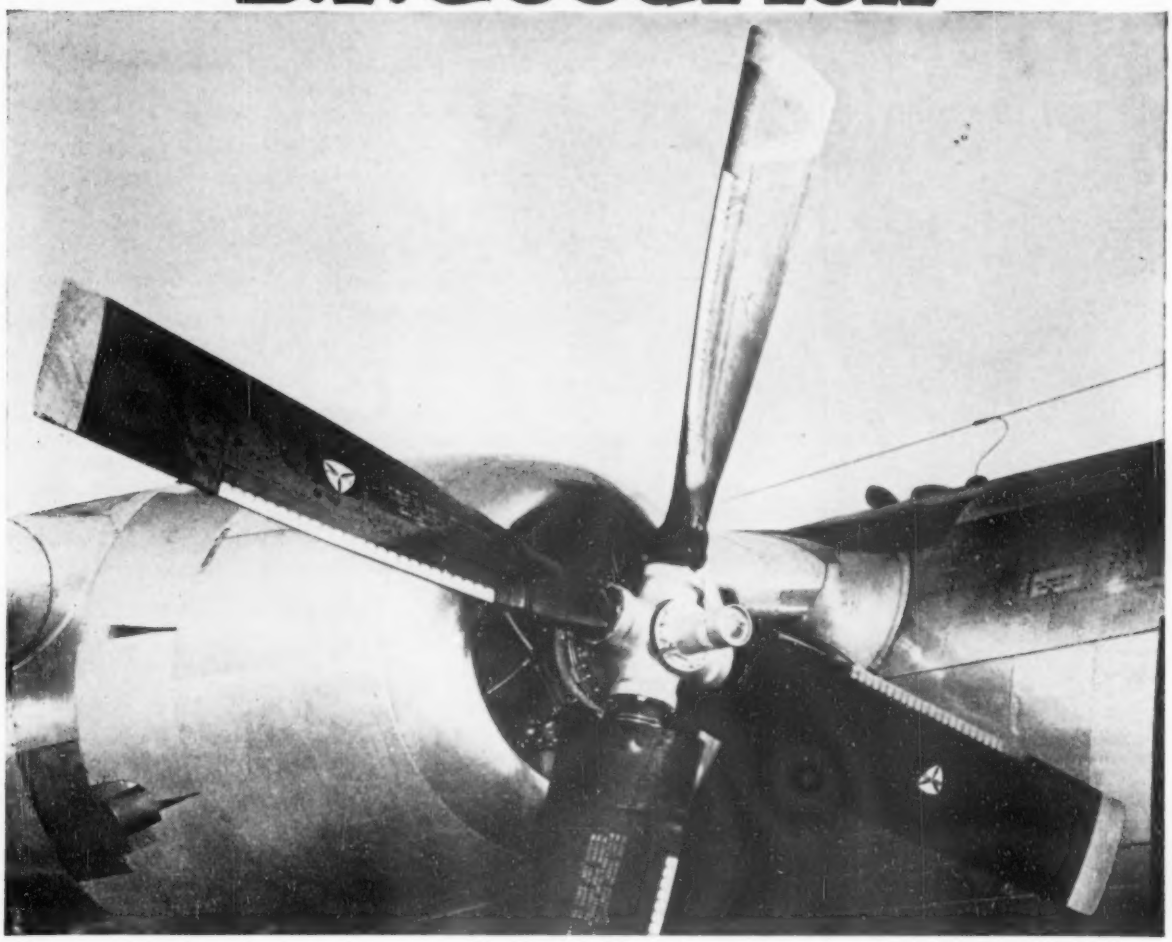


Engine-driven, line-mounted Fuel Booster Pump. Delivers 23,000 lb. per hour Aviation Gasoline at 10 psig discharge pressure, 12,000 rpm Shaft Speed.

*High Vapor/Liquid Ratio

EVERY FIGHTER, EVERY BOMBER, EVERY TRANSPORT IS HYDRO-AIRE EQUIPPED

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



"Two-way stretch" adds life to B. F. Goodrich shoe

STRAIGHT electric wires in propeller shoes do a good job of supplying the heat needed to remove ice. Yet they haven't enough "give" when installing the shoe around a curved propeller blade and not enough ruggedness to take the effects of normal vibration. In either case, stresses may cause the wires to weaken and break, and the shoes have to be replaced.

B. F. Goodrich engineers set out to design a prop shoe for the Air Force's C-119 Packet that would solve these problems. First, they adopted the idea of using stranded wires . . . miniature cables that add strength without adding weight. Then, they crimped the wires into a "zig-zag" shape. This gives the shoe a built-in flexibility, lets it *stretch two ways* to prevent wire breakage.

B. F. Goodrich also designed a separate heated rubber skin for the propeller cuff, using the same zig-zag wire arrangement. The new B. F. Goodrich "two-way stretch" propeller shoe and cuff are now in service on the C-119, giving long service life and dependable ice removal.

A typical development of B. F. Goodrich engineering and research for aviation, electrically-heated rubber is also used on wings, hydraulic lines, water tanks, spinner domes, jet engine intakes and many other airplane parts.

B. F. Goodrich heated rubber has other advantages. It can supply heat either in cycles to loosen ice so the airstream can carry it away—or constantly, to keep ice from forming. BFG heated rubber can be operated from the plane's regular power supply. It simplifies design, saves weight, can be cemented on.

Other BFG aviation products: tires, wheels and brakes; De-Icers; Avtrim; inflatable seals, fuel cells; Pressure Sealing Zippers; Rivnuts; hose and other accessories. *The B. F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

B.F.Goodrich
FIRST IN RUBBER

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AIRCORD

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THIS NEW ROEBLING BOOKLET is the only practical and accurate manual ever offered designers and engineers on the physical characteristics of airplane control cord.

The first half of the booklet deals with the elastic properties of Roebling Aircord. It shows why the usual AE values of metallic cord and wire rope are not applicable to aeronautical service . . . gives elastic stretch tables . . . compares the elongation curves of bare and of Roebling Lock-Clad Aircord, and graphically describes the special design and service features of Lock-Clad.

The latter half of the booklet deals with the thermal properties of control cord . . . The coupon below will bring your free copy by return mail. John A. Roebling's Sons Corporation, Trenton 2, N. J.

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John A. Roebling's Sons Corp.
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Aviation Week

MAY 31, 1954 Vol. 60, No. 22

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Los Angeles 17—1111 Wilshire Blvd., Phone MAdison 6-4323

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Aviation Week is served by Press Association, Inc., a subsidiary of Associated Press.

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AVIATION WEEK • MAY 31, 1954 • Vol. 60, No. 22
Member ABP and ABC

Published weekly by McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder. **Publication Office: 99-129 North Broadway, Albany 1, N. Y.**

Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Donald C. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Executive Vice-President, Publications Division; Ralph B. Smith, Vice-President and Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.

Subscriptions: Address correspondence to AVIATION WEEK—Subscription Service, 99-129 North Broadway, Albany 1, N. Y. or 330 W. 42nd St., New York 36, N. Y. Allow 10 days for change of address.

Subscriptions are solicited only from persons having a commercial or professional interest in aviation. Position and company connection must be indicated on subscription orders.

Single copies 50¢. Subscription rates—United States and possessions, $6 a year; $9 for two years; $12 for three years. Canada $8 a year; $12 for two years; $16 for three years, payable in Canadian currency at par. Other Western Hemisphere, $10 a year; $16 for two years; $20 for three years. All other countries, $20 a year; $30 for two years; $40 for three years. Entered as second-class matter, July 16, 1947, at the Post Office at Albany, N. Y., under Act of Mar. 3, 1879. Printed in U. S. A.

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Cable Address: "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL.

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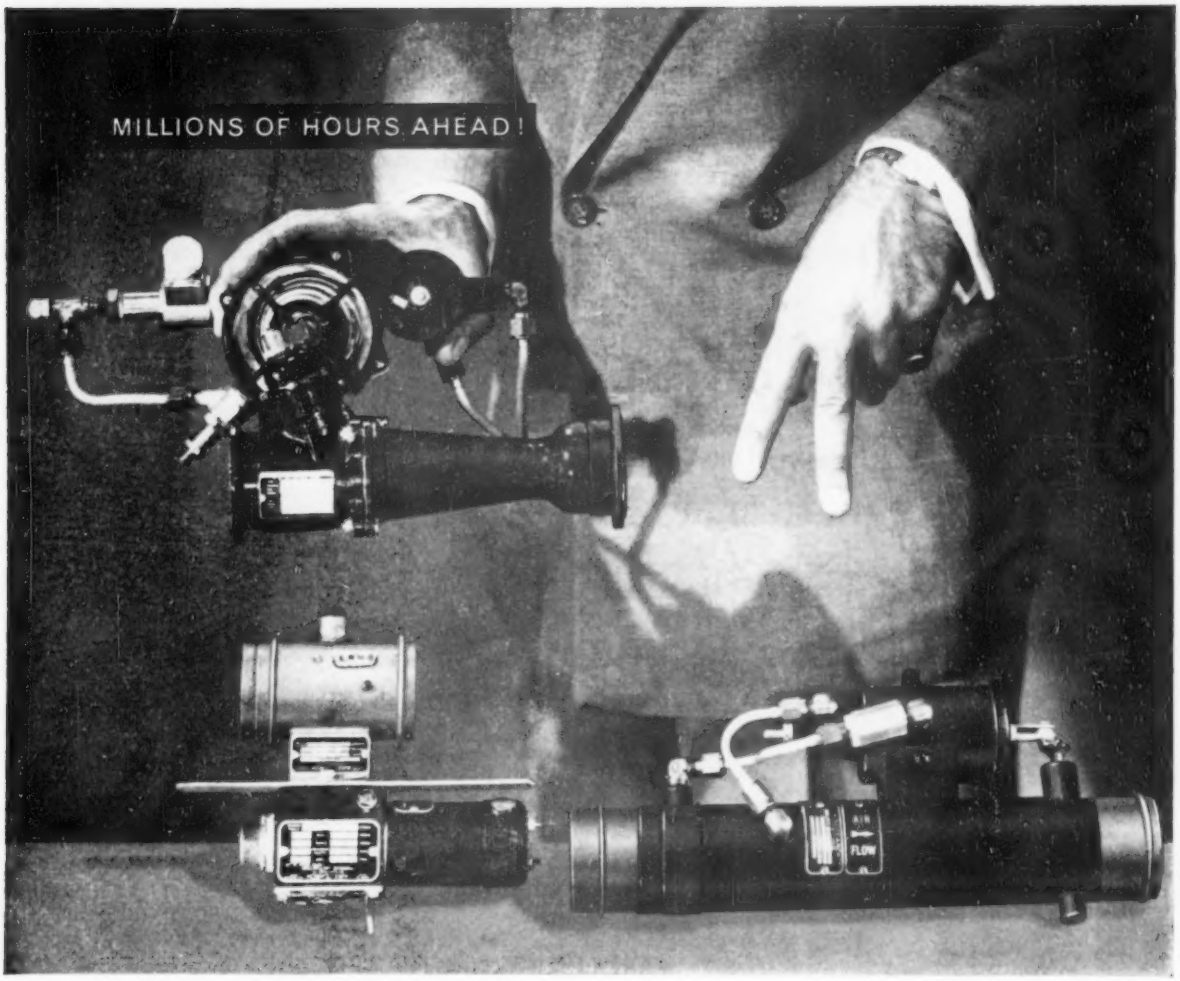

SAVES WEIGHT, SPACE, MONEY...

New Two-in-One Air Flow Valve!

For the first time, AiResearch combines air flow control and shut-off valves in a *single* lightweight, highly efficient unit!

Seeking constantly to simplify the vital components it makes for today's supersonic jet aircraft, AiResearch has now combined two functions into one device . . . *at lower cost!*

The new combination air flow control and shut-off valve weighs 1.2 lbs. less than the two units it replaces. It takes up less vital space. Made of steel instead of aluminum, it can withstand pressures up to 220 psig instead of 83 psig; and temperatures up to 800°F instead of 580°F.

Experience of AiResearch engineers in producing over 160,000 air valves, consuming more than 600,000 research and development hours, is reflected in this newest achievement.

For here, as in all AiResearch production, the goal is ever greater performance from smaller size and weight at lower cost. If you have a problem in any of the fields listed below, consult our engineering-manufacturing team.

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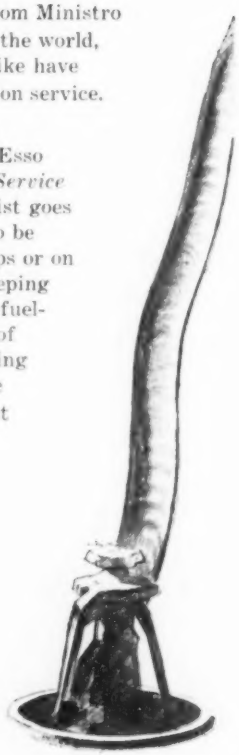

of all the world's international airlines . . . 8 out of 10 use

Esso

AVIATION PRODUCTS

NEWS DIGEST

Domestic

President Eisenhower last week accepted the Aviation Policy Report of the Air Coordinating Committee (AVIATION WEEK May 3, p. 12) with the comment that he will "use it as a guide to future policy" on aeronautical problems confronting his Administration.

Convair F-102 is scheduled to begin a flight test program about June 15 at the Palmdale, Calif., test center for production jet aircraft. Approximately 100 Convair personnel will be at the center for the trials. F-102 flight tests also will continue at Edwards AFB.

Navy Viking rocket last week set a new altitude record of 158 mi. at White Sands, N. M., topping the previous mark by 22 mi. The Martin-built, single-stage missile hit 4,300 mph. during the test, 300 mph. faster than a Viking fired May 7 (AVIATION WEEK May 17, p. 7).

First production F9F-8, latest version of Grumman Aircraft Engineering Corp.'s Cougar jet fighter series (AVIATION WEEK May 3, p. 9), last week was delivered to the Navy at the builder's Bethpage, N. Y., plant.

World endurance record for aircraft and crew was set last week by a Navy ZPG-2 Goodyear blimp. It left Lakehurst, N. J., with 15 persons aboard. After being airborne for 200 hr., the lighter-than-air ship landed at NAS Boca Chica, Fla. The test was held to study crew endurance problems on long-range, anti-sub patrol.

Brig. Gen. Milton W. Arnold (USAF Ret.), vice president-operations of Air Transport Assn., has withdrawn his $1-million alienation-of-affection suit against George M. Bunker, president of Glenn L. Martin Co. (AVIATION WEEK Apr. 12, p. 7). The general will litigate in a Baltimore court for custody of his adopted son, Charles E. Ford, Arnold's attorney said. His marriage to Dorothy D. Michael May 15 was announced following the new court developments.

"Backyard" helicopter, new two-place craft built as a family vehicle (AVIATION WEEK Feb. 22, p. 29), will be put on display for the first time early next month at Delanco, N. J., by Glenview Metal Products Co. The builder claims operation of the Flyride can be learned in a few days, says its cost will be near that of a high-priced car.

Nine-week strike of production workers at Curtiss-Wright Corp.'s Propeller Division ended last week when the IAM members voted to accept a new company offer of a two-year contract and return to the Caldwell, N. J., plant. Terms of the contract: five-cent-an-hour wage increase with guarantees of another five-cent boost in a year plus additional hospitalization and insurance benefits.

First Production Learstar Goes Aloft

Still wearing its protective zinc chromate coat, here is the first Lockheed 18 re-engineered by Lear, Inc., Santa Monica, Calif., to come off the production line. Designed for a normal cruising speed of 300 mph., the Learstar will undergo certification as a new type transport plane. Among changes visible from standard Lockheed 18 are panoramic windshield, fuselage-stabilizer fairing housing ADF and omni antennas, retractable tailwheel and new nacelles housing 1,425-hp. Wright C9HD engines. Lear says it has a number of orders for the Learstar.

Financial

Beech Aircraft Corp., Wichita, has declared two special common stock dividends of 25 cents each, the first since the company omitted regular quarterly payments after USAF canceled the T-36 contract last year (AVIATION WEEK May 3, p. 7). The dividends are payable June 9 and July 9 to stockholders of record May 24 and June 24.

Fairchild Engine & Airplane Corp., Hagerstown, Md., had net earnings of $1,164,000 for the first quarter of 1954, highest three-month profit in the company's history. Sales totaled $36,938,000 ($39,117,000 first quarter 1953).

Mohawk Airlines reports a net loss of $34,550 for 1953, a setback blamed on a subsidy cut plus increasing expenses throughout the year. Operating revenues totaled $2,921,724, but overall expenses added up to $2,956,274.

American Airlines will pay a 15-cent dividend June 21 to common capital stockholders of record June 4.

International

De Havilland Comet 3 is scheduled to make its first flight next month.

Simplified fuel system, improved pressurization and radio equipment will mark the six Vickers Viscount turboprop transports ordered by Trans-Australia Airlines. First deliveries are scheduled for July.

Fairey Firefly Mk. 8 officially is revealed to be a radio-controlled target-drone version of the piston engine, two-place fighter series used by Britain's Royal Navy.

Edward Griffiths, chief test pilot for Armstrong-Siddeley, was killed May 20 when a Royal Navy Wyvern attack fighter crashed and burned shortly after takeoff from Bitteswell Aerodrome near Rugby, England.

Two Sikorsky H-19 helicopters have been delivered to the Philippine air force under the U.S.-Philippine Mutual Assistance Pact. The copters are the first of five H-19s promised to PAF.

Japan aircraft production plan for fiscal 1954 will cover more than $1.4 billion worth of trainers, liaison planes, helicopters and their spare parts and overhaul, a spokesman of the Ministry of International Trade and Industry states. More than $1.2 million worth of this will be scheduled for export, it is noted.

Fokker aircraft factory is taking over the aviation department of Royal Company de Schelde, Dordrecht, The Netherlands. The latter firm has been in aviation for 20 years and has worked with Fokker and Aviolanda on 430 Gloster Meteors for the Dutch and Belgian air forces.

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9 FUEL IMMERSION
10 PLUGGING
11 OVERHEATING
12 SHOCK

call for the assistance of our electrical laboratory and research engineers

In the meantime write for our new file folder catalog which lists units, with and without brakes and noise filters, that are ready for immediate production!

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The Aviation Week

May 31, 1954

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NATURE'S

MISTAKE

Fortunately for Archie, the Archaeopteryz, he had no competition from jets. Archie was the first bird and things in the air were pretty scarce at the time. Archie's idea of a terrific flight was to climb a tree and soar down on some poor, hapless reptile. Anything in the air came as quite a surprise in those days, so Archie usually caught his dinner and stayed peacefully on the ground until the pinch of hunger forced him up another tree. Too bad nature didn't tool him up better for the job because, as soon as something came along that could flap its wings, the competition put Archie out of business. Today Archie is not even a memory, but the lesson of competition is still with us. Being properly tooled up for the job is more essential than ever. If you have a tooling problem, turn it over to the Berg Organization for, only in having the best product in the world, properly tooled up, is your future safe.

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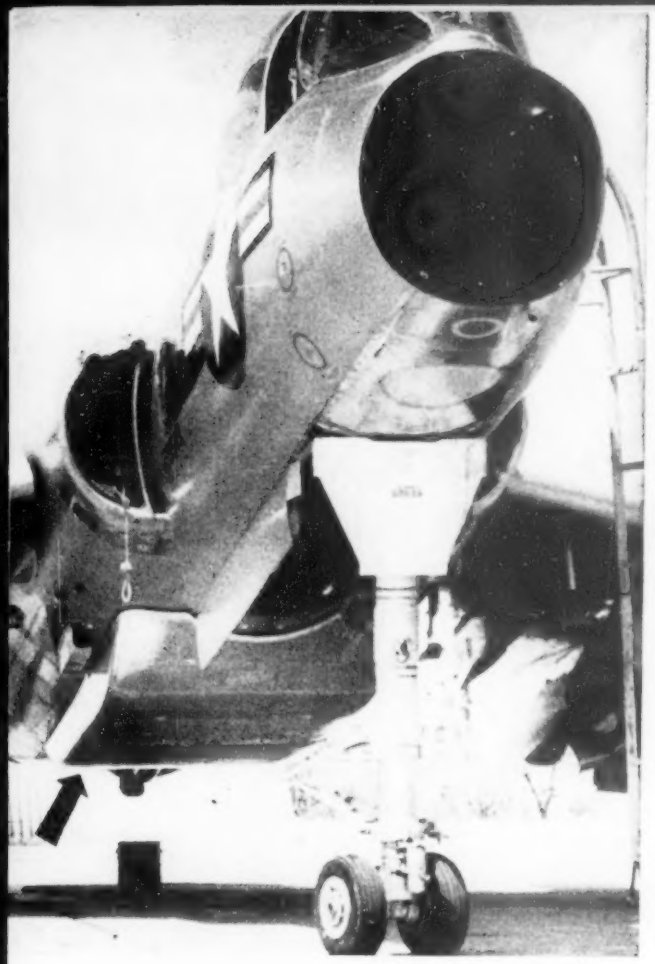

CHANCE VOUGHT F7U-3, seen in dramatic flight closeup (above), is fitted with nose probe for aerial refueling (Aviation Week May 17, p. 9). Cutlass closeup at left details the new aluminum underbelly rocket pod (arrow) carried by the twin-jet Navy fighter. The new launcher can be reloaded after firing its 2.75-in. missiles.

New U.S., British Jets In the Military Lineup

PERCIVAL JET PROVOST model (below) shows configuration of new basic trainer ordered for Royal Air Force. Adapted from the Alvis Leonides piston-powered Provost trainer, the new craft will have a 1,640-lb.-thrust Armstrong Siddeley Viper ASV.5.

HELICOPTER OR DC-7

NATIONAL AIRLINES

INCORPORATED

FLIES CHAMPION SPARK PLUGS "ACROSS THE BOARD"

The healthy growth of National Airlines is based on progressive service. An excellent example is its regular helicopter flights—first by a scheduled domestic airline.

National's Sikorsky S-55 helicopter whirls passengers from Miami International Airport to West Palm Beach with intermediate stops along the Florida Coast. During the racing season daily schedules are flown between Miami and the operating race tracks.

Says C. H. Calhoun, National's Vice-President of Engineering and Maintenance:

"Needless to say Champions are installed in our helicopter. That makes it Champions across the board in our DC-7's, DC-6B's, Convairs and Lodestars. We feel the helicopter addition to our operation is progress, and Champion Spark Plugs, as usual, are playing their vital part in that progress."

National's confidence in Champion is shared by ninety-four other major airlines—a good fact to remember the next time *you* buy spark plugs.

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SPARK PLUGS

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WHO'S WHERE

In the Front Office

William Littlewood, formerly American Airlines vice president-research has been named vice president-equipment development, succeeding **M. G. Beard**, now assistant vice president-equipment development. **George C. Van Nostrand**, vice president-general manager AA de Mexico has been appointed vice president-properties and community relations, succeeding **Walter H. Johnson**, now vice president-sales manager. Van Nostrand also will continue to supervise the Mexico operation with **F. J. Mullins** as assistant general manager. Other new AA assistant vice presidents: **Arthur D. Lewis**, planning; **William C. Lawrence**, engineering and **John J. Casey**, maintenance.

William Larrabee, vice president-general manager, becomes executive vice president of Radioplane Corp., Northrop Aircraft subsidiary. Other Radioplane changes: **M. W. Tuttle** becomes vice president-operations; **Ferris M. Smith**, vice president and assistant to the president in addition to heading foreign sales; **Alex Callam** is director of military relations and field service.

L. Keith Covelle has been named special assistant to vice president and assistant general manager, Aircraft Division, Kaiser Metal Products, Inc., Bristol, Pa.

Gen. Leland W. Miller, (USAF, Ret.), formerly vice president-finance with Convair, has joined Engineering & Research Corp., Riverdale, Md., as financial vice president. Miller was chief of USAF Budget and Finance Office 1937-1946.

Myron A. Tracy, formerly deputy for materiel programs, office of the assistant secretary for materiel of USAF, has joined the Garrett Corp., Los Angeles, as a member of the president's staff.

Honors and Elections

George F. Chapline, vice president-general manager, Fairchild Engine Division, Fairchild E&A Corp., N. Y., has accepted sponsorship of the 1955 Aeronautic Production Forum of the Society of Automotive Engineers scheduled for April 1955.

Charles H. Kaman, president of Kaman Aircraft Corp., Bloomfield, Conn., has been awarded the Connecticut Junior Chamber of Commerce distinguished service award for "outstanding contribution to Connecticut in founding and guiding what has become one of Connecticut's leading industrial enterprises."

Changes

A. J. Pierce has been appointed manager of overseas lines for Canadian Pacific Airlines.

Kenneth G. Boyd, formerly procurement, subcontracting and facilities officer for the B-47 production committee, Wichita, Kan., has been named regional representative for Bridgeport Brass Co., Aluminum Division, at Wichita, Kan., and also has been appointed operational consultant for Electronics Corp.'s Aviation Division at Wichita.

Continued on page 54

INDUSTRY OBSERVER

► Progress with atomic artillery has made obsolete at least one family of short-range guided missiles designed around conventional warheads. Army planners feel slight range differential in favor of the missile is outweighed by the advantages of mobility and reliability of the cannon.

► **Powerplant for Republic's F-103 features an unusual valving arrangement to bypass intake air around the turbojet and feed it directly to the afterburner for highspeed operation. A separate ramjet engine is not needed.**

► Aircraft Industries Assn. board of governors, at its annual spring meeting at Williamsburg, Va., voted to stand on a policy of refusing to accept direct sponsorship of an American aircraft show similar to Britain's Farnborough. Indications are, however, that National Aircraft Show in Dayton will get more support from individual companies.

► **Royal Canadian Navy has accepted delivery on three Piasecki HUP helicopters. Based at Dartmouth, Nova Scotia, they will be used on new Arctic patrol vessel, HMCS Labrador, to hunt icebergs and resupply outposts.**

► General Electric is developing and will produce limited number of defensive fire control systems for Boeing B-52 to backstop similar program at Arma.

► **Piasecki is preparing to lift the Army's 4,300-lb. 105-mm. howitzer with the H-21C Work Horse. First step is to qualify slings for the helicopter. Sikorsky's H-19 has carried the 75-mm. pack howitzer, weighing 1,425 lb. Bigger gun now has to be carried in three loads, reassembled in the field.**

► Average maintenance and operation cost per USAF aircraft was $19,666 in fiscal 1953, and $13,350 in fiscal 1954, a recent study shows. Estimate for fiscal 1955 is about $19,900 for each plane.

► **Defense Department reportedly has directed Air Force and Navy to develop a new numbering system for all categories of aircraft. Planes would be assigned consecutive numbers after a letter designation of its mission in a style similar to that used for jet engines. Air Force would get odd numbers, Navy even.**

► Computation of spare parts requirements for the Boeing B-52 necessitates consideration of 80,000 to 90,000 component parts. As a result of a detailed study, USAF is purchasing support quantities for only 12,000 to 15,000 components.

► **USAF is seeking $180 million for fiscal 1955 for the modification of in-service aircraft. Air Force has established the following governing criteria for modifications: Combat planes will remain in the active inventory for one year after the modification is completed, non-combat aircraft two years.**

► Packaging costs of aircraft parts have been reduced sharply because of a recent Air Force project which developed an interior and exterior container. Interior container is a crate for air shipment; exterior container is used for surface shipment. Example of cost reduction: previous packaging cost for C-54 vertical stabilizer was $297.07; present cost is $177.64.

► **The four cargo pits of the Douglas DC-7 will hold up to 16,030 lb. However, United Air Lines, most recent airline to put the new Douglas plane into transcontinental service, has set cargo capacity at 9,000 lb. with 58 passengers and their baggage.**

► USAF is optimistic about reducing the lead time period in ordering aircraft. Officials cite the reduction of lead time in components used in the end product. For example, lead time for aluminum ingots has been cut from five to three months in the past two years.

AVIATION WEEK

VOL. 60, NO. 22

MAY 31, 1954

Moscow's May Day Air Review

Reds' Surprise: 15,000-Lb.-Thrust Jets

- **Big axial-flow engines indicate that Soviet gas turbine development program may be ahead of U. S., Britain.**
- **But observers say airframe design appears lagging, with new bombers definitely in the subsonic range.**

By Robert Hotz

Biggest surprise of the 1954 Russian May Day air show over Moscow (AVIATION WEEK May 10, p. 14) to foreign observers was the appearance of 10 jet bombers propelled by a large, new axial-flow turbojet more powerful than any American or British engine now flying.

Technical experts estimate that the new Russian axial turbojet engine produces about 15,000 lb. thrust. Appearance of the big new Russian jet engine indicates the Soviet gas turbine development program may have forged ahead of both the United States and England.

►**Power Is the Key**—The 10,000-lb.-thrust Pratt & Whitney Aircraft J57 split-compressor axial turbojet is the most powerful American engine now flying in production aircraft. The British do not have either of their 10,000-lb.-thrust jets—the Bristol Olympus or the Rolls-Royce R.A.14 Avon—flying in production aircraft.

Because power is the key to military aircraft development and because engine performance is at present the limiting factor on top speeds of the current crop of American fighters and bombers, the sudden appearance of the Russian 15,000-lb. jet is regarded as particularly significant.

Turbojets in a similar power class are well along in development by several U.S. engine manufacturers but none has powered an aircraft in flight. U. S. projects in the 15,000-lb.-thrust class:

- Pratt & Whitney Aircraft J75.
- Wright Aeronautical J67.
- General Electric J79.

Some of these engines probably will be used in installations with afterburners that can add up to 50% of the basic thrust rating for short periods. It probably will be at least another year before any of these engines power as many aircraft as flew in the Moscow air show.

►**Reds Confident**—Some indication of Soviet confidence in their new jet can be gathered from the appearance of the Russian heavy jet bomber—comparable in size to the Boeing B-52 (AVIATION WEEK May 24, p. 14) and powered by four of the new 15,000-lb.-thrust jets—flying low over Moscow several times in two weeks during rehearsals preceding the May Day display.

In addition to the heavy bomber the new jet engine powered nine medium bombers comparable in size to the Boeing B-47.

Russian axial-flow jet development stems directly from German engineers who began work in the Soviet Union after World War II. The Germans pioneered the axial turbojet design in their first prewar experiments and continued to follow its basic pattern throughout the war in contrast to the centrifugal-type compressor favored by the British.

85 New Jets

New Air Force contracts for F-101s and F-102s were disclosed last week in a Commerce Department summary of government contract awards.

McDonnell Aircraft Corp. has received a $34,025,262 contract for 28 RF-101As, reconnaissance version of the Voodoo penetration fighter, including spares and special tools.

Convair Division of General Dynamics Corp. was given a $79,942,059 order for 57 aircraft. Twenty of them will be TF-102A trainers and the rest F-102 interceptors.

Both the F-101 and F-102 are powered by Pratt & Whitney Aircraft J57 jet engines. The McDonnell plane has two powerplants, the Convair fighter one.

Westinghouse pioneered U. S. development of axial turbojets under Navy sponsorship during World War II, working independently of both British and other U. S. firms experimenting with aircraft gas turbines.

►**German Development**—Foundation of the Russian axial jet development were two German engines, the Bavarian Motor Works Model 003 and the Junkers 004, both of which were in production during World War II in underground factories.

First postwar Russian jet fighters, such as the Yak-15 and the MiG-9, were powered by German axial-flow turbojet engines.

First postwar progress indication of Russian and German collaboration in this field came with the appearance in 1951 of the twin-jet Il-28 light bomber powered by two axial turbojets slung in pods under the wings. These jets were in the 5,000-6,000-lb.-thrust class, roughly comparable in power to the General Electric J47 series of axial turbojets.

►**Subsonic Design**—Consensus of foreign observers at the Moscow air show is that Russian airframe design is lagging behind Soviet powerplant development.

While the 15,000-lb.-thrust turbojets are capable of pushing an airframe past Mach 1, both new Russian bomber designs definitely are subsonic and probably considerably slower than their B-52 and B-47 counterparts.

Both the heavy and medium bombers show a marked British, rather than American, design influence. Most prominent feature is the decision to bury jet engines in the wing root rather than sling them under the wing in external pods. The buried engine technique has been a trademark of British multi-jet aircraft design from the Comet transport through the Victor, Vulcan and Valiant bomber series. The buried engines require a relatively thick wing root section limiting aircraft performance to subsonic speeds.

►**Tupolev Credit**—The new Russian heavy jet bomber came as no surprise to most foreign observers since its existence had been a poorly kept Russian secret for many months. Russians probably will credit the design to Andrei Tupolev who previously has received Soviet recognition for his work in adapt-

ing USAF B-29 (Tupolev-4) and B-35 (Tupolev-200) designs.

The new Tupolev design is strongly reminiscent of the British Comet with buried engines, and tapered, sweptback wing of extremely high aspect ratio. Taper is so marked on this bomber that the wings almost come to a point at their tips. The new Russian bomber appears to gross about 300,000 lb.

It apparently is equipped with a radar bombing-navigation system. Its turret-mounted defensive armament is relatively old-fashioned for a modern jet aircraft.

Informed guesses indicate that the new Russian heavy bomber is still in the development cycle and volume production comparable to Boeing's present B-52 manufacturing rate is still several years away.

Appearance of a squadron-sized formation of the new medium bomber was more of a surprise to foreign observers in Russia.

Nine of these bombers flew in the Moscow show, indicating that it is well past prototype development. It apparently is an Ilyushin design with gross weight approximating 150,000 lb., and its two 15,000-lb. jet engines are buried in the wing roots. It has high-aspect-ratio, sweptback wings.

▶ **Two Trends**—Appearance of the two new jet bomber types over Moscow has stirred two general trends of opinion among foreign observers:

• Russians closely are paralleling basic USAF policy on long-range strategic air force development. They are devoting a major effort to developing and building a long-range jet bomber striking force capable of waging atomic and hydrogen warfare against North American targets.

Consensus of informed observers is that the Russians are still at least several years behind USAF's Strategic Air Command in everything except engine development. The ostentatious display of the two new Russian jet bombers over Moscow is regarded as a studied effort to convince both domestic and foreign observers that the Soviets are reducing the tremendous advantage once enjoyed by USAF in strategic bombing capabilities.

• Russian turboprop bomber development (AVIATION WEEK Feb. 15, p. 12; Mar. 15, p. 90) was strictly an interim phase aimed at covering a development interval during which the big axial turbojet engine program still was hatching.

It appears that the Russians, after a relatively brief but sizable effort devoted to turboprop development, now have turned their major effort toward a turbojet-powered bomber force aimed at counter-balancing the tremendous force of USAF's Strategic Air Command in the world balance of power.

In addition to the two new bomber types, the Russians displayed more than 80 new jet fighters, all advanced developments of basic MiG-15 and 80 Il-28—straightwing light bombers.

707 Accident Delays Flight Several Weeks

First flight of the new Boeing four-jet 707 Stratoliner-Stratotanker prototype will be delayed several weeks, the company says, as a result of damage incurred when the left landing gear gave way during taxi tests May 21 at Renton Airport, Wash. Pictured shortly after the accident, the 707 (top) rests on the runway. Closeup (right) details damage done to the wing when the landing gear gave way. According to a statement given out by Boeing, no primary wing or airplane structure was damaged, but a portion of the wing flap and skin structure behind the left wing spar was affected and undersurfaces of the two port jet nacelles were scraped. It is pointed out that the 707's landing gear is designed so that in event of failure it will not rupture main wing supports or fuel tanks. Not a drop of fuel was lost during the mishap, the company reports.

Missiles Get Top USAF Priority

Intercontinental weapon development may be shifted to a special project similar to the Manhattan District.

By Claude O. Witze

USAF is giving top priority to the development of long-range missiles, although fiscal 1955 budget figures and statements indicate the overall missile procurement program is being reduced.

A joint office-type project organization, now being referred to as another Manhattan District, may be launched to accelerate the intercontinental missile program. Recent shift of the Guided Missile Office to a position where it is responsible directly to Chief of Staff Gen. Nathan F. Twining was the first step in this direction (AVIATION WEEK May 17, p. 13).

► **Production Deferred**—Brig. Gen. Thomas P. Gerrity, director of procurement and production engineering, told the Senate Appropriations Committee that USAF is emphasizing development and testing of missiles, limiting production to such items as the Matador, with completed development phase.

"Since our presentation last year," Gerrity said, "an intensive review of this program has been made with the result that both the fiscal year 1953 and 1954 programs were reduced by deferring the production phase of certain missiles until demonstrated development progress warrants high-volume production."

However, Air Force said, in view of Soviet maneuvers and the increased potency of the H-bomb, "everything is subject to change." It was pointed out that an urgent military situation, such as existed in World War II, made it practical to set up the original Manhattan District sparing no expense.

► **Modification Delays**—The philosophy expressed to the Senate committee by Gerrity is based on the fact that a large part of a guided missile, particularly the electronic equipment, is newly developed and not thoroughly proved. This, it was pointed out, is bound to result in a steady stream of modifications that will delay production.

USAF estimates show the following figures for expenditures on production of complete guided missiles:

1953 (actual)	**$162,777,584**
1954 (estimate)	**374,222,363**
1955 (estimate)	**303,447,000**

Other expenditures—for spares, planning, modification and auxiliary equipment—will bring the 1955 guided missile total up to $466,521,000, compared with $678,449,741 in 1954 and $243,589,369 in 1953.

USAF's request for funds covers the procurement of completed guided missiles, including production engineering, service testing, engineering changes, basic airframe, control systems, propulsion units and guidance equipment for each type.

"These missiles," USAF says, "will be used for continued operational testing to improve their potential use, to train personnel in the operation of missile firings, and to initiate the equipping of units currently being activated and to be activated in the near future."

► **Program Goals**—The program offered to Congress aims to obtain as quickly and cheaply as possible the missiles needed to insure "maximum defense of the United States in case of an air attack, the maximum tactical support of air and ground operations and the ability to operate strategically against the industrial capacity of an aggressor nation."

It is expected that stress on missiles with intercontinental range will increase, although USAF has made no details public for security reasons. The B-61 Matador, a short-range missile, is operational and two squadrons are in Europe.

Progress and program on Falcon, Rascal, Snark, Bomarc and other weapons remain under military security wraps. The Bell B-63 Rascal (air-to-ground) is the only strategic bombing missile so far announced (AVIATION WEEK Jan. 18, p. 18; Apr. 26, p. 12).

► **Funds**—In his presentation to the Senate committee, Gerrity offered an overall aircraft program for 1955 that totaled $4,405 million, of which $1,645 million already has been appropriated. The new funds of $2,760 million have been approved by the House.

The general emphasized plans to arm "for the long pull" with a strength of 137 wings to be reached by the end of fiscal 1957. He told the committee USAF has been able to cut the quantities of older aircraft, keeping the program within the capacity of an efficient industry and encouraging greater competition. He said production will be continued at a rate substantially higher than pre-Korea levels.

► **Standby Plants**—On the subject of the Air Force production reserve policy, Gerrity said: "As production levels reduce, we will of necessity have to place certain plants in standby status. However, it is our objective to retain a capability for early reactivation of these plants through mobilization preparedness plans and contracts with industry.

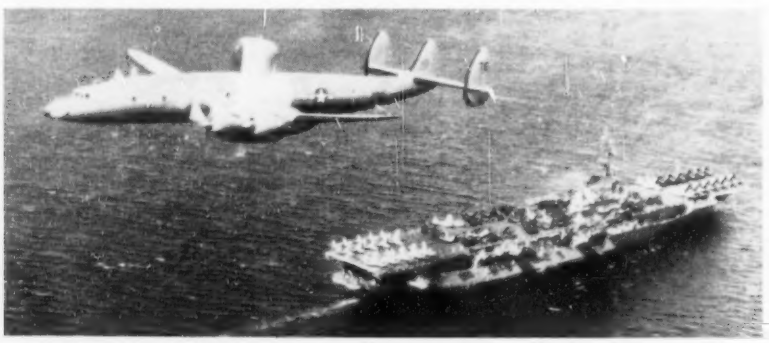
"In other cases, where economically feasible, we will maintain pilot lines in order to attain the fastest possible buildup in the event of an emergency."

► **Leadtime Reduction**—Gerrity said USAF plans to buy "the most modern aircraft which can be produced consistent with our plan for adequate testing of new models prior to quantity production for the combat inventory."

He told the committee that, on the basis of USAF's experience last year, there will be further reductions in reorder leadtimes. He said the cut reflects "increased capacity of industry, further experience on models continuing in production, more experienced manpower and the elimination of material shortages."

Other points made by Gerrity:

• New funds of $175,900,000 are re-



Connie Radar Picket Teams With Carrier

First photo of Navy air-and-surface team comprising a Lockheed WV-2 Super Connie loaded with radar equipment and a carrier, such as the USS Oriskany shown under the plane's tail. Day or night the 31-man WV-2 crew can fly at high altitude on the outskirts of Navy task forces, their radar "vision" extended far beyond the capabilities of the fleet by the plane's height. If an enemy shows up on its detection gear, the WV-2 crew can warn the fleet to take speedy action. USAF uses similar Super Connie radar pickets, designated as the RC-121C (Aviation Week Sept. 24, p. 17).

quested for initial component spares and spare parts to keep new planes serviceable for one year and provide necessary stocks for five and a half months. He said USAF has set up new procedures for control of expensive items and made other economies.

• Modification of combat aircraft, where the cost is not prohibitive, is limited to planes that will remain in active service at least one year. For non-combat planes, the period is two years.

• USAF expects to spend $15 million in fiscal 1955 for industrial mobilization. More than 80% of this money will be used to maintain facilities and equipment already owned by the government.

• Through reorganization, USAF has slashed the manpower necessary for procurement, production, contract audit, contract administration and quality control services.

McDonnell Sees New Complexity Problems

Growing complexity and an increasing number of changes point to new complicating factors in aircraft manufacturing, according to Kendall Perkins, vice president-engineering of McDonnell Aircraft Corp. His forecasts:

• Wings and tails will be thinner, making access to parts inside the surfaces more difficult.

• Skins will be thicker, demanding more accurate forming.

• Structures that carry heavy loads will become heavier, and more elements will be combined into a single part. This means more forgings, more elaborate machining and new forging techniques.

• More tapered and sculptured skins will be required to get rigidity, lightness, tightness and smoothness. This also will require new machines.

• Outside contours will have to be smoother. This will require changes in design, new tooling and assembly techniques, particularly at skin joints.

• More equipment and wiring and plumbing. All must be made smaller, lighter, more reliable and easier to install and maintain.

• More refrigeration and insulation will be needed to combat heat at speeds in the Mach 2 range.

Beyond the fighter field, Perkins believes eventually more companies will be working on missiles than on combat planes.

New Beech Orders

Beech Aircraft Corp., Wichita, Kan., has received an order for three D18S trainer-transports from the Chilean navy, will deliver the first planes in August. Colombia recently placed an order with Beech for 10 T-34 Mentors.

Report Scores Offshore Program

Senators also say American aid has turned European plane plants into 'formidable competitors' of U. S. firms.

A "thorough and careful reappraisal" before any further investment is made to build up Europe's aircraft manufacturing capacity is urged in a report by Sens. Styles Bridges and Stuart Symington.

"America has contributed billions of dollars to help rebuild such basic industries as chemicals, steel, textiles and aircraft," the report declares. "These rebuilt industries contribute materially to the economic stability of the (European) countries. However, these industries have now become formidable competitors of the same industries in the U.S. Our own income has been and is being taxed to strengthen this foreign competition."

It urges that "every effort be made to induce NATO countries to place follow-on orders" so the aircraft and other industrial capacity do not collapse when U.S. orders taper off.

▶ **Fiat Contract**—The senators particularly object to the $22.5-million contract with Italy for assembly of 50 North American F-86K Sabres by Fiat Co., declaring that it is "uneconomical nor does it greatly increase the military production base in Europe."

The total cost of the 50 aircraft will be $54.5 million, because $29.5 million will be paid North American for furnishing parts being sent to Fiat and $2.5 million for two prototypes, the report states.

"This is an expensive procedure," the report comments. "It will result in the ultimate cost of these 50 planes being greatly in excess of the price paid for 50 such planes in the U.S."

The contract also requires a royalty payment of $5,000 per plane by Fiat to NAA. "But this is not too pertinent," the senators observe, "because the U.S. government will pay the cost incident to this uneconomical operation."

It is noted that the contract was a "directed procurement"; the U.S. decided for policy reasons that a source for the North American plane should be established in Italy and little consideration was given to price.

Only 1,200 of the 70,000 workers at the Turin plant of Fiat will be employed on the aircraft contract, the senators say.

▶ **Potential Production**—Declaring that "the potential production capabilities of aircraft plants in Western Europe are excellent," the report makes these points:

• "The Communist strength in France and Italy is a grave threat: 72% of the workers employed by Fiat are Communist; in France, the Communist-dominated union, General Confederation of Labor-Workers Force, receives over half the votes in elections in defense industries."

• Workmanship in the two plants of Avions Dassault, producing the Mystere 4 with U.S. financing, "is far above average and would compare favorably with the best in the U.S."

• Personnel of Britain's Hawker Aircraft Co., producing Hawker Hunters with U.S. financing, "are highly qualified to manufacture aircraft. They compare favorably with American producers."

• Of the 100-plus programmed European airfields being jointly financed by NATO countries, "more than two-thirds are in a sufficiently advanced stage of construction so they could be used in an emergency."

• In view of the Spanish airbase program, "the program of airbases in both Europe and North Africa should be carefully re-examined."

Bridges made the two-week inspection tour as a representative of the Senate Appropriations Committee and Symington as a representative of the Armed Services Committee. The Appropriations Committee, of which Bridges is chairman, will consider fiscal 1955 funds for European defense assistance in the near future.

▶ **Contract Methods Scored**—The report objects to the method of letting contracts for European aircraft: "Overall amounts are first agreed to between this country and the foreign government, then an agreement is reached on a negotiated price basis as to how many planes and/or spare parts will be furnished for the sum already decided upon."

It made these observations on U.S.-financed aircraft programs:

• **United Kingdom.** Two contracts provide: $140 million for purchase of 465 Hawker Hunter interceptor day fighters at a delivered unit price of $207,000; $12.8 million for 107 Sea Hawks at a unit price of $119,720. Delivery of the Sea Hawks commenced a year ago. Deliveries on the Hawker Hunter contract are scheduled to commence in March 1955.

Hawker Aircraft Co., together with its associated companies, could produce 300 Hunters monthly with a minimum of subcontracting. "Although exterior surfaces show a high degree of care in assembly and finish," the report says, "subassembly and production details

do not measure up to workmanship standards established at U.S. plants."

• **Royal Air Force modernization.** In fiscal 1954, an estimated $260 million will be given the British government for modernization of RAF. Additional funds will be asked for fiscal 1955, the senators say. Planes involved in the modernization include Hunters, Swifts, Javelins and Canberras.

• **France.** An $86.5-million contract provides for 225 Mystere 4 aircraft at a unit price of $280,000. Deliveries are to start soon.

The potential of the Dassault plants in Paris and Bordeaux is 200 aircraft a month, the report says, "but with present tooling they can support a schedule of only 50 to 75 planes a month with not more than 30% of the component parts subcontracted."

Maximum production of the Mystere is estimated at 40 a month, it says.

• **Belgium.** A $24-million contract provides for purchase of 64 Hawker Hunters and spares at a unit price of $234,206. Delivery on the contract is scheduled to start in March 1955.

• **The Netherlands.** An $18-million contract provides for 48 Hawker Hunters at a unit price of $234,206, with deliveries to start in March 1955.

"Some Air Force officials in Europe state that, primarily for strategic reasons, they were not too pleased with the placing of these fighter contracts in the Low Countries," the report says.

• **Republic Aviation International.** A $50-million contract with this wholly-owned subsidiary of Republic Aviation Corp., incorporated in Switzerland, provides for spare parts for 669 F-84F aircraft. The work will be performed in French plants. An 8.5% profit was allowed on the cost-plus-fixed-fee contract, with incentive provision permitting up to a 10% profit.

• **Curtiss-Wright, Europa.** A $27-million contract with this wholly-owned subsidiary of Curtiss-Wright Corp., incorporated in The Netherlands, provides for delivery of sufficient spare parts for 340 overhauls, 944 maintenance periods and rotating stock for J65 engines. The work is to be performed in plants throughout Western Europe. An 8.5% profit was allowed on the contract, plus $451,181 for general administrative expenses.

C-W Reports Salaries

Curtiss-Wright Corp. paid its chairman and president, Roy T. Hurley, $146,721 in salary during 1953, the firm reports to the Securities & Exchange Commission.

Salaries of other Curtiss-Wright officials: George R. Hill, vice president-finance, $47,721, and Edward M. Powers, vice president-engineering, $55,490.

New Bell Copter

- **Wing-shaped fuselage transport under study.**
- **Design has two wingtip rotors, seats 20-50.**

Preliminary designs for a new type of commercial transport helicopter are on the drawing board at Bell Aircraft Corp.'s Texas Division at Ft. Worth.

Bell officials confirmed, in response to queries, that they are exploring the possibilities of a new concept in helicopter design but withheld any comment on its details.

▶ **Wing-Shaped Fuselage**—However, AVIATION WEEK learned from reliable industry sources that the new Bell design involves a wing-shaped fuselage with a rotor mounted at each tip. In the commercial transport version, passengers would sit facing forward with the rotors to their left and right at the end of the fuselage.

The new design shows promise of exceeding the speed of the latest helicopters now flying. It is expected to be applied in various configurations, seating from 20 to 50 passengers and capable of operating over 250- to 300-mi. intercity stage lengths.

Early models of the new Bell design probably will use a pair of piston engines (either Wright R1820s or Pratt & Whitney Aircraft R2800s), although later versions would be adaptable to gas turbine power. Each of the two piston engines would be installed inside the wing near the tip. Engines would be geared together so that either or both powerplants could drive both rotors.

▶ **Lift Transfer**—The engine and drive system are basically similar to those now used in current tandem-rotor configurations.

The Bell design is aimed at single-engine performance as a safety factor. In the event of an engine failure, both forward speed and altitude could be maintained on one engine.

Because of the aerodynamically clean configuration of the "wing-type" fuselage, a partial transfer of lift from the rotors to the wing will occur during forward flight, making it possible to reduce both rotor and engine rpm. during cruising flight similar to the throttling-back procedures on fixed-wing aircraft. Reduction of rotor speed during flight is not possible in conventional helicopters, and has been responsible for high fuel consumption and excessive engine wear.

▶ **Design Feature**—The throttling feature on the new Bell design is expected to produce lower maintenance costs, longer engine life, lower fuel consumption and extended range, all of which are major goals for operators of commercial and military helicopters (AVIATION WEEK May 17, p. 14).

The thickness of the wing-type fuselage would allow for a fully retractable landing gear and internal engine housing.

The wing-shaped fuselage will have no control surfaces. All flight maneuvering of the new Bell design will be accomplished by the twin rotors as in conventional helicopters. It is expected that Bell will stick to its two-blade rotor system in the new design.

▶ **Previous Studies**—Side-by-side rotor configurations were explored earlier by Focke, Platt-Le Page and others; however, the Bell version varies considerably from these earlier efforts in that it eliminates much of the normal fuselage drag. Bell's entry into this new design field is understood to have begun with experiments by its chief helicopter test pilot, Floyd Carlson, flying the HSL anti-submarine copter sideways to determine the extent of power losses on the rear rotor in normal flight.

The laterally disposed rotor design may prove to be more efficient than either single- or tandem-rotor configurations in forward flight, particularly at minimum power speed which is vital to meet CAA's single-engine operational requirements.

Board Hearings End On 8-Hr. Crew Rule

Question of whether or not it is safe to permit pilots flying domestic routes to remain on the job more than eight hours is now up to Civil Aeronautics Board.

The Board held oral argument last week on American Airlines' request for a waiver (AVIATION WEEK May 17, p. 108) from the 8-hr. limitation for single crews set by the Civil Air Regulations. American was joined by United and TWA. Opposed to the waiver are Air Lines Pilots Assn. and Flight Engineers International Assn.

▶ **Schedule Problem**—Problem is American's difficulty in maintaining its 7-hr. 55 min. schedules on DC-7 east-west nonstop flights. Civil Aeronautics Administrator Fred B. Lee in April set a time period ending July 1 (AVIATION WEEK Apr. 26, p. 18) during which American is to show if it can maintain its east-west flights on schedule 50% of the time.

In briefs submitted to the Board prior to the hearing, United Air Lines said that unless the requested waiver was approved, "the full benefit to be derived from the long-range DC-7 will not be realized."

TWA said that operation of nonstop

flights under a waiver would permit flights at high altitude or around adverse weather, avoiding heavy traffic at lower altitudes and eliminating landings and takeoffs at crowded intermediate airports. TWA said such a waiver should "embrace all four-engine equipment capable of longhaul nonstop operations."

▶**ALPA View**—ALPA protests the waiver, citing the fact that the safety record of domestic air carriers has been built on the 8-hr. regulation. "The eight-hour limit was enacted after extensive research and study by medical authorities, flight specialists and others," ALPA points out.

"The safety rule which American Airlines now seeks to destroy by waiver has been in effect for more than 23 years," ALPA says. "The waiver method appears to have been selected by American in an attempted effort to create in the minds of the Board members the impression that some sort of an emergency exists, rather than utilizing the more normal procedures of processing safety regulations which ordinarily seem to take several years."

ALPA was seconded in its viewpoint by FEIA president William D. Kent.

▶**Change Requested**—ALPA filed an application with CAB Mar. 22 for an adjustment in the flight time limitations covering international operations, to change the international regulation from 12 hours to eight. The Board has not acted upon the application as yet, ALPA charges. American, in its waiver request, cited the 12-hr. international regulation as evidence that the Board believes a pilot can fly more than eight consecutive hours safely.

"It is interesting to note that prior to American's application for this waiver," ALPA said, "both United and TWA, the principal transcontinental competitors of the petitioner, had concluded that it was impossible to operate either the DC-7 or 1049 (Super Constellation), their fastest aircraft, within the flight time requirements of the CARs and had planned their flights for a stop en route."

BDSA Delays Buildup Of Titanium Stockpile

Commerce Department has authorized titanium mill products manufacturers to divert 10% of their output to civilian uses.

The action, taken by the Business and Defense Service Administration, will delay the buildup of a working inventory to assure aircraft manufacturers a supply. Office of Defense Mobilization recently authorized the purchase of a 4,000-ton inventory by the government (AVIATION WEEK May 17, p. 26).

Before the diversion to civilian use was authorized, the surplus at the end of 1954 was estimated at 3,000 tons. The diversion of surpluses to other-than-aircraft uses has been urged vigorously by the titanium industry.

Navy Skyhook Sets New Altitude Record

New research balloon altitude record has been set by the Navy's Skyhook, which soared to more than 117,000 ft. after launching at Minneapolis, Minn.

The balloon carried 50 lb. of instruments put aboard by the Office of Naval Research. It landed about 80 mi. from its starting point.

Distance record for plastic research balloons is held by USAF's Moby Dick, which drifted 6,250 mi. from California to Spain (AVIATION WEEK May 17, p. 7).

The Skyhook, built by General Mills, Inc., is 200 ft. in diameter and has a volume of 3,200,000 sq. ft. Deflated, it is 282 ft. long and contains three acres of polyethylene film.

Results of the Navy flight are described as "successful, but not perfect" because of "technical troubles." Data collected is used in study of cosmic rays.

Comet Will Undergo Cabin Pressure Test

A de Havilland Comet jet transport fuselage will be submerged in a tank of water and high pressure built up inside the plane to see how effective the structure is, a British Air Ministry official reports.

The test is scheduled to be held soon at Britain's Farnborough experimental center.

The underwater test will determine whether the plane's pressurization system could have been responsible for the fatal crashes that grounded the world's first scheduled jet transport (AVIATION WEEK May 10, p. 13). The cabin pressure test is to be made underwater to minimize the danger of an explosion that would hurl pieces of the fuselage in all directions.

Farnborough also will handle the most rigorous portion of Comet flight tests. DH has run some air tests using dye-impregnated fuel to spot possible leaks. The Comet to be flown by Farnborough is G-ANAV, a Series 1A originally destined for Canadian Pacific Airlines and taken over by British Overseas Airways Corp.

B-47s Now Use Two-Chute System

Boeing B-47 Stratojet medium bombers are now using a drag chute to permit steeper landing angle in addition to a larger chute for braking following touchdown. Top photo shows the method during an early test flight. The B-47 has a 16-ft. landing chute extended behind it. Lower view shows another B-47 trailing the landing chute and its 3-ft. braking chute. Smaller chute is stowed in left side of rear fuselage.

How Airport Aid Will Be Sliced

State	Allocation of 75% of $11 million in fiscal 1953	Allocation of 50% of $30 million proposed for fiscal 1955	State	Allocation of 75% of $11 million in fiscal 1953	Allocation of 50% of $30 million proposed for fiscal 1955
Alabama	$157,345	$278,727	Nevada	152,660	275,683
Arizona	173,424	313,181	New Hampshire	27,174	49,072
Arkansas	123,844	223,646	New Jersey	144,283	260,556
California	504,669	911,366	New Mexico	181,942	328,564
Colorado	176,327	318,423	New York	481,067	868,744
Connecticut	62,806	113,419	North Carolina	182,637	329,819
Delaware	11,994	21,660	North Dakota	111,847	201,982
District of Columbia	22,200	40,090	Ohio	278,924	503,700
Florida	157,238	283,952	Oklahoma	155,320	280,487
Georgia	173,955	314,140	Oregon	172,055	310,709
Idaho	128,283	231,662	Pennsylvania	351,102	634,043
Illinois	317,788	573,884	Rhode Island	23,471	42,386
Indiana	157,401	284,246	South Carolina	100,178	180,908
Iowa	147,727	266,776	South Dakota	121,319	219,086
Kansas	162,851	294,088	Tennessee	147,372	266,135
Kentucky	135,332	244,391	Texas	571,060	1,031,259
Louisiana	140,394	253,533	Utah	132,867	239,941
Maine	71,206	128,589	Vermont	23,297	42,072
Maryland	81,071	146,405	Virginia	148,225	267,675
Massachusetts	141,627	255,760	Washington	160,231	289,357
Michigan	305,410	551,531	West Virginia	87,702	158,377
Minnesota	197,908	357,395	Wisconsin	183,459	331,302
Mississippi	124,788	225,351	Wyoming	139,322	251,597
Missouri	202,429	365,560			
Montana	213,618	385,767	**Total**	**$8,306,250**	**$15 million**
Nebraska	140,101	253,004			

Note: Federal airport aid was suspended by the new Administration in fiscal 1954. The Administration is seeking to use 50% of fiscal 1955 funds at its discretion.

Commerce Lifts Airport Aid Block

An Administration request of approximately $30 million for fiscal 1955 airport aid does not hinge on enactment of legislation increasing the Commerce Department's control over the allocation of funds.

Earlier apprehension that the Administration would make airport aid contingent upon the new allocation authority was removed by the Deputy Undersecretary of Commerce for Transportation, Charles Dearing, in testimony before the Senate Interstate and Foreign Commerce Committee.

He said the Administration favors a "substantial sum" for fiscal 1955 airport grants and that the request "is not predicated" upon passage of legislation giving Commerce Department additional control over allotment of funds.

This removes the main barrier to the fiscal 1955 aid program. The legislation increasing Commerce's authority aroused widespread opposition in Congress.

▶ **Sharp Split**—Hearings before the Commerce Committee showed a sharp split among aviation groups on the Administration measure, which would:

- Ban funds for terminal buildings.
- Increase from 25% to 50% the "discretionary" portion of airport funds. Under present law, 75% of appropriations are allocated to states on a basis of population and area. This would be reduced to 50%.
- Require that projects be "of sufficient national importance," as determined by the Secretary of Commerce, to receive federal aid.
- Provide that unused funds apportioned to states be made available for discretionary use.

▶ **Aid Criteria**—Commerce Department's Charles Dearing told the Senate committee the requirement that projects be "of sufficient national importance" would "by no means limit the airport aid program to merely a few of the largest airports in the country."

He said the criteria of national importance to be used would be 3,000 enplaned passengers per year or a based aircraft population of 30, or a combination of these factors with 100 passengers equal to one based aircraft. Dearing reported that 760 airports, accounting for 99.6% of the total domestic scheduled passenger airlines traffic meets this eligibility test.

Other testimony highlights:

- Air Transport Assn. and Airport Operators Council supported the Administration measure.
- National Association of State Aviation Officials and American Municipal Assn. vigorously opposed it.

Two Democratic members of the committee—Sens. Mike Monroney and Lester Hunt—objected that the measure would result in the development of existing major airports and would end development of new and small airports for feeder and helicopter services. "How would you ever get service to new cities, if airport aid depends on existing traffic?" Monroney asked. "How would you ever get airfields for developing helicopter operations?"

Sen. John Bricker, the committee chairman, objected to retracting on commitments for federal aid for terminal facilities.

No committee member present defended the Administration's proposal.

▶ **ATA View**—Supporting the increase in the discretionary fund, ATA's secretary, J. D. Durand, declared that "experience under the Federal Airport Act has shown that there will never be enough federal funds to 'go around.' Thus the federal government, by some objective, selective process, must pick out those airports which have a sufficient degree of national importance to warrant federal financial aid."

He urged that federal agencies be required to pay rentals for space in terminal buildings if federal aid for their construction is banned.

Fred M. Glass, director of aviation for the Port of New York Authority and president of the Airport Operators Council, recommended that the discretionary fund be increased to even more than the 50% proposed by the Administration. "The greater the amount of the discretionary fund, the greater the good," he declared.

Glass said the Administration's proposed criteria under which 760 airports would have sufficient traffic to warrant federal aid is too lenient. The council is composed of the management of 38 of the country's largest airports.

▶ **Opposing Views**—A. B. McMullen, executive secretary of the National Association of State Aviation Officials, called for complete elimination of a discretionary fund, leaving the total airport aid appropriation for apportionment among the states under a formula laid down by Congress. He said Commerce's plan to base airport aid on the amount of traffic activity already existing at an airport is contrary to the national policy "toward decentralization of industry and business to reduce the possible disastrous effect . . . by an enemy bombing attack. . . ."

He suggested that airport appropriations be made on a biennial basis.

Randy Hamilton, director of the American Municipal Assn., representing 12,000 cities, declared the Administration's proposal would leave "to bureaucratic whim or arbitrary juggling of figures pulled out of a hat" the determination of what airport projects have "national interest." He objected to "freezing and jelling the list of those airports eligible for federal aid by narrow bureaucratic definition."

Declaring that the nationwide "system" concept of airport of the 1946 Airport Act would be invalidated by the Administration's proposal, Hamilton asked: "Can anyone definitely determine that an airport which presumably is not in the national interest today will not be so tomorrow?"

technical bulletin

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Senate Restores Cut In NACA Budget

Senate Appropriations Committee approved $56.7 million for fiscal 1955 activities of the National Advisory Committee for Aeronautics, restoring $3.4 million that House action had eliminated.

The House reduced the Administration's original request of $58.2 million for NACA by a total $4.9 million. NACA asked the Senate committee to restore only $3.4 million, which included $3.1 million for administrative expenses for initiating operation of three unitary plan windtunnels, $120,000 for improvements on a 8-ft. by 6-ft. tunnel for supersonic tests and $151,000 for a new rocket facility at the Lewis Flight Propulsion Laboratory.

▶ **Construction Fund Less**—NACA's fiscal 1955 operations will be on a substantially lower level than this year. The $58-million budget originally proposed by the Administration compares with NACA's current year budget of $62.4 million.

Biggest reduction is in the construction program. The $4.6 million proposed for fiscal 1955 compares with a $11.4-million program for this fiscal year. The House is expected to agree to restore its $271,000 cut in the $4.6-million program as recommended by Senate Appropriations Committee.

This provides for:

- **Ames Laboratory.** Building a new test section for an existing windtunnel to increase highspeed capabilities.
- **Langley Laboratory.** A new facility for research on landing and takeoff characteristics of highspeed seaplanes.
- **Lewis Laboratory.** New rocket engine test facility; alternations on an existing windtunnel to increase its speed range; additional air-handling equipment for engine research facilities.

Bridges Withdraws 'Rate War' Legislation

A move that would open the gates for a rate war among airlines and with railroads for defense business temporarily has been blocked.

Sen. Styles Bridges withdrew an amendment to an appropriation bill that would permit the Defense Department to contract at free or reduced rates with air carriers on the assurance that the matter would be taken up by the Senate Interstate and Foreign Commerce Committee.

The committee's chairman, Sen. John Bricker, has introduced the Bridges amendment as legislation which is now pending before the committee. Civil Aeronautics Board and the three competitive airlines associations—Air Transport Assn., Air Coach Transport Assn., and Independent Military Air Transport Assn.—vigorously are opposed to the proposal.

▶ **Two Fights**—Under an outmoded provision intended to recompense the government for land-grant rights, the railroads have been able to bid lower than airlines for military traffic (AVIATION WEEK Apr. 5, p. 13).

In addition to fighting for repeal of this provision permitting railroads to

Civil Aircraft Backlog Drops 7%

Backlog of unfilled orders for civil aircraft of 3,000 lb. airframe weight and over totaled 301 at the end of February, 7% below January.

Shipments during February, measured by airframe weight, amounted to 1,243,100 lb. This represented a major gain over the previous month.

	1954 February	1954 January	1953 February	1954 Jan.-Feb.	1953 Jan.-Feb.
Complete aircraft	240	278	382	518	747
By weight of airframe:					
Less than 3,000 lb.	210	254	356	464	674
3,000 lb. and over	30	24	26	54	73
By number of places:					
1- to 5-place	205	253	356	458	674
More than 5-place	35	25	26	60	73
By total rated hp., all engines:					
Up to 399 hp.	205	253	356	458	674
400 hp. and over	35	25	26	60	73
Total value of complete aircraft and parts (000 omitted)	$44,129	$30,490	$24,405	$74,619	$49,489
Aircraft total	36,830	24,302	17,087	61,132	34,831
Aircraft parts	7,299	6,188	7,318	13,487	14,658
Total value of aircraft engines and parts (000 omitted)	$11,634	$11,405	$9,129	$23,039	$20,025
Aircraft engines	5,952	4,840	2,387	10,792	6,044
Engine parts	5,682	6,565	6,742	12,247	13,981

Source: Department of Commerce.

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offer reduced rates for government business, air transport interests now are faced with another fight to prevent Defense Department from capitalizing on the situation and get cut rates from airlines, as well as rails.

▶ **CAB Stand**—In a letter to chairman John Bricker of Senate Commerce Committee, CAB vice chairman Harmar Denny declares:

"The business of the Department of Defense represents a significant proportion of the air transportation business. To permit this business to be conducted by air carriers at free and reduced rates, entirely exempt from the controls applicable to the rates available to other users, would be inconsistent with the policy of the Civil Aeronautics Act and would obviously impair, if not altogether destroy, the effective continuation of existing rate policy with respect to the industry as a whole.

"To the extent that the Department of Defense would be able to have property and passengers transported at free or reduced rates, the decrease in revenue to the carriers caused thereby would in the long run have to be made up either by increased charges to the public or by increased governmental financial support."

Bridges says his intention in sponsoring the proposal was solely to save Defense Department money.

June 18 Deadline Set For C-46 Comments

Industry has until June 8 to submit comments to Civil Aeronautics Board on the two modification proposals (AVIATION WEEK Apr. 12, p. 18) for the Curtiss C-46 transport.

Under consideration are the proposals of Aircraft Engineering Foundation, Inc., which would cost approximately $15,000 per airplane and Air Carrier Engineering Services, which would be less than $65,000 per aircraft. The latter proposal is backed by Air Transport Assn.

▶ **Comments Limited**—CAB set July 1 as the deadline for modifying the C-46 so as to comply with the transport category requirements. AEF's proposal includes certain pilot training and aircraft maintenance provisions which are proposed to prevent the recurrence of accidents involving pilot error and deficient aircraft maintenance.

However, the Board considers the immediate issue to be that involving the future certification status of the C-46. Comments are asked only on airworthiness and performance aspects of the proposal.

Half of AEF's modification program has been certificated by Civil Aeronautics Administration.

An AEF-modified C-46 was to be given final test May 25 at Burbank, Calif., under the supervision of CAA's Fourth Region.

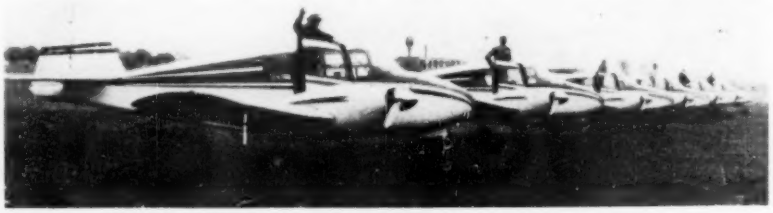
AEF currently has a training plan in progress for giving chief pilots and CAA inspectors a complete checkout on the C-46 at the CAA Aeronautical Center in Oklahoma City, Okla., in cooperation with CAA. The courses are designed to make the pilots familiar with the aerodynamic and performance limits of the airplane and to give them instruction on methods of presenting the information to their pilots.

Examiner Approves Bonanza Renewal

Bonanza Air Lines' application for certificate renewal is approved by Civil Aeronautics Board Examiner Walter W. Bryan. In his initial decision in the case, Bryan concluded that the Nevada airline's certificate should be extended to Dec. 31, 1957.

Bryan's decision becomes final May 25 if there are no exceptions. Under the certificate, Bonanza could operate between Reno, Nev., and Phoenix, Ariz., and the intermediate points, Hawthorne, Nev., Las Vegas, Kingman and Prescott, Ariz.

Bonanza would also be permitted to fly between Phoenix, Los Angeles and Burbank, Calif., via Yuma, Ariz., El



Piper Delivers First New Apaches

Six Piper Apache twin-engine, four-place business planes line up at the company's Lock Haven, Pa., factory prior to delivery to distributors. First plane has been received by E. H. Brockenbrough, Carolina Aircraft Sales, Charlotte, N. C., who had the highest percentage gain of sales over his 1953 quota of all of Piper's 52 domestic distributors. Thirty-two Apache airframes are currently in production or on flight test. Plans call for building one plane every day by June 1.

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Centro and San Diego, Calif. The airline also is authorized to continue its shuttle service between Las Vegas and Death Valley on a seasonal basis for the period between Oct. and Apr. 30 each year.

Josh Lee Tries to Ease Feeders' Lot

Absorption of local service carriers by trunklines for the "immediate expediency of terminating the subsidy" is a "penny wise" policy, says Civil Aeronautics Board member Josh Lee.

". . . I fear that much we have achieved during the past 10 years in developing a broad base for the air transportation industry would be sacrificed if we should transfer the communities now being served by the local carriers to the trunks for service," Lee told the national convention of the American Association of Airport Executives in Louisville, Ky.

Lee offered a formula for determining airport terminal rental charges which would reduce costs to feederlines by about $500,000 annually, based on data from 82% of the airports served by local-service lines.

The formula:

- $1 per sq. ft. for all airports served exclusively by local airlines.
- At each of all other airports the rental charges per sq. ft. shall be at the rate of $1 plus the result of 25 cents multiplied by the total number of trunklines serving that airport. The maximum rate should not exceed $3 per sq. ft. at any airport.

Swedish AF to Get New Saab S-29Cs

(McGraw-Hill World News)

Stockholm—Svenska Aeroplan Aktiebolaget (Saab) soon will deliver to the Royal Swedish Air Force its latest version of the single-seat J-29 jet fighter, a highspeed photo-reconnaissance model designated the S-29C.

The S-29C will replace piston-engine Supermarine Spitfire P.R. 19s.

Saab also reports the Imperial Ethiopian Air Force is negotiating for additional 91B Safir all-metal three-place trainers. A new four-place model, the Saab-91C, is produced in Holland under a subcontract agreement.

Also being built in Holland under subcontract are six Saab-90-A2 Scandia twin-engine transports. This project is split up among Fokker, Aviolanda and De Schelde. Four of the planes are for the Brazilian airline Viacao Aerea Sao Paulo (Vasp) and two for Scandinavian Airlines System (SAS). Deliveries are scheduled for mid-1954.

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How Convair Idea Men Map the Future

- **Planning office must anticipate tomorrow's needs, bring together thinkers and doers.**

By William J. Coughlin

San Diego, Calif.—Convair's Thomas G. Lanphier, Jr., boarded an airplane here the other day and took off for Omaha for a session with gruff, cigar-chewing Gen. Curtis LeMay, boss of the Strategic Air Command.

Gen. LeMay is not a man who talks to salesmen; but Tom Lanphier deals in an unusual commodity. His stock in trade: ideas.

The 38-year-old vice president of Consolidated Vultee Aircraft Corp. is assistant for planning to president Joseph T. McNarney. He and his staff are responsible for much of the long-range thinking upon which Convair's future depends.

▶ **Routing an Idea**—It is comparatively easy for a big aircraft concern to handle something like a new airplane, a wing spar, a fuel tank, or an instrument panel. Those are things you can design, engineer and produce.

An idea is something else. How do you handle it? Where do you find it? What do you do with it?

Each aircraft company has found its own answer to that problem. At Convair, the task falls to Lanphier's Office of Long Range Planning.

Lanphier operates by traveling—he's been to Washington 15 times in the past 12 months—and by talking. "People are helpless unless they communicate with each other," he says.

The Long Range Planning Office therefore is somewhat of a communications center designed to bring together ideas and the people who can do something about those ideas. Its most important pieces of equipment are the telephone and the airplane ticket.

The department has 10 persons in it, including the stenographers. "We don't need a large department," Lanphier explains. "While we are supposed to do original thinking of our own, an equal mission is to serve as a catalytic agent. Sales, engineering and other departments have planning responsibilities; it is our job to see that they exercise them, that their planning is integrated between the operating divisions and with the general offices."

'COMMUNICATIONS CHIEF' Lanphier (left) discusses future project with J. V. Naish (right), Convair executive v.p., and R. C. Sebold, v.p.-engineering.

▶ **High Level**—Lanphier reports to the president on an equal level with the vice presidents of engineering and sales. This is in line with McNarney's aim to establish coordination of sales and engineering by someone not responsible to either of them.

From 60 to 100 ideas a month may flow through the Long Range Planning Office, originating from the company's engineers—one of the chief sources of information for the department—or from the services themselves. But there is more to the job than sifting through ideas from within the company.

Lanphier, his staff, and their counterparts in the operating divisions must stay constantly abreast of current military and political thinking.

"You have to assess what the national policy is," he remarks. "As it shifts, defense requirements for the future shift. For instance, the general shifting of defense policy during recent months under the Eisenhower Administration toward emphasis on air weapons for retaliation and defense. This has significant implications as to weapons systems this nation may be using toward the end of this decade, particularly in light of what the Soviets may have in the way of offensive and defensive systems at that same time."

The planning department must anticipate and evaluate military requirements wherever possible, must on occasion be prepared to second-guess the strategic estimates of the services. To do this, it also must be a sort of intelligence center which can estimate, to the extent civilians might be able to do it, Russian capabilities on a sound basis.

▶ **Important Task**—Decisions important to the company's future can hang upon the accuracy of these evaluations. For example, Convair has withheld from at least two recent major competitions for aircraft programs. In one the aircraft required by the military was considered by Convair to be too slow in relation to other American and Soviet aircraft likely to be in the forces at that same time. In the other instance, the performance of the airplane itself would be technologically more advanced by Convair's estimate at least, than other elements of the system in which it is to operate.

"We don't presume we're smarter than the men who establish military requirements," Lanphier remarks. "That would be neither correct, nor wise. But, in this business, we have to face the hard-boiled fact that the military annually requests bids on many more projects than ever become hardware.

"Back in the years after World War II, the several services launched over two dozen missile programs of one sort or another. Of those, only one-third are still active, though others have since been initiated. In competition like this, where less than one out of three entries even finishes, we have to do some second-guessing and crystal-ball-gazing as to which entry we're going to back—or we go out of business playing the field. It is really a case of if it's good for the

country's defense, it's good business for Convair."

The planning department also must follow through on current production schedules and engineering projects. "You can't assess a new idea unless you know what you're already doing, and what your capabilities for taking on and meeting new obligations may be," Lanphier comments.

There can be no doubt that one of the department's most important services to the company is one not written into its charter. Through personal contacts with Convair's customers, particularly the military, the planners keep posted on current thinking and occasionally lend a hand to commercial and military sales.

▶**Planning Team**—Lanphier's staff, though small, is composed of what he calls "good self-starting thinkers." He has five staff assistants.

• **R. D. Williams,** former Navy lieutenant, handles statistics and maintains the picture of where the company stands according to schedule on its scores of projects at any given moment.

• **W. M. Howard,** engineer and expert analyst in the field of commercial aviation is "inside man" for the team, handles the evaluation machinery for new ideas, and compiles the company's monthly report which keeps Convair's executives posted on current planning.

• **J. R. Dempsey,** West Pointer, and ex-fighter pilot, who was an Air Force missile specialist, is an engineer.

• **Les Murray,** also an ex-fighter pilot, is a calm, deliberate thinker who has been with Convair since World War II.

• **Ted LeFevre,** formerly in the planning department of the du Pont company, came to Lanphier's office from the Convair public relations staff.

Results of the long-range planning department thus far have been intangible due to the lead time in planning. Hardware now coming off assembly lines is the result of decisions made several years before Lanphier's office was set up.

For instance, Lanphier points out, the fact that the Eisenhower policy of emphasis on aerial retaliation and defense coincides with a current Convair complex of programs featuring intercontinental bombers and supersonic interceptors and air defense missiles is a credit not only to McNarney's regime, but to the preceding management, with men like Jack Naish, now executive vice president, and R. C. Sebold, engineering vice president, carrying over into the present planning begun several years ago.

▶**Executive Duty**—When Gen. McNarney was named president in April 1952, one of his assignments was to introduce management stability at Convair. Stability requires long-range planning. That was the formal start of the LRP office.

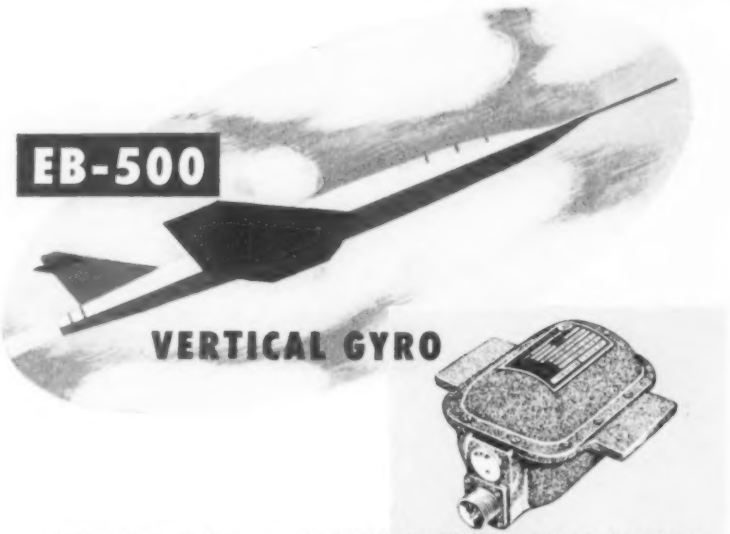
Lanphier had resigned from the National Security Resources Board in May 1951 to join Consolidated Vultee as assistant to the president, at the urging of Convair board chairman Floyd B. Odlum. He became a vice president in November of that same year, at the age of 36.

He already was at work in the planning field when McNarney arrived on the scene. The new president asked Lanphier to draw up a charter for a formal long-range-planning department.

When Odlum recruited him, Convair, with divisions in Fort Worth and Daingerfield, Tex., and Pomona and San Diego, Calif., was running into trouble in its planning. With no formal organization for processing new ideas, engineering staffs were at work in a wide number of fields without coordination. The company found itself with not enough engineers to go around but still taking on new projects.

Under McNarney's regime, that is changed. If the Ft. Worth Division, for example, comes up with a new product proposal—originating within the division itself or perhaps suggested by a customer, either military or commercial—the division passes the suggestion along to the long-range planners and

DISPLACEMENT GYRO FOR PITCH AND ROLL CONTROL



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at the same time begins its own analysis. The division makes a recommendation for or against and passes this on to LRP.

▶ **Right Routing**—Then Lanphier and his staff see that the idea reaches the right staff people, for discussion and recommendation to McNarney for his final decision. Due to the high level upon which it operates, the LRP staff sometimes can obtain a decisive answer on an idea within an hour or two after it reaches Lanphier's office.

"We are not supposed to be experts," Lanphier says. "We just see that the experts get together."

Lanphier, however, must make recommendations to the president based upon the evaluations of the experts.

New product proposals are analyzed on the basis of three questions:

- **Can we do it?**
- **Is it feasible?**
- **Does it fit?**

The last perhaps is the most important. Convair has outlined in a 10-year program the basic areas of interest of the company. These at present include both aircraft and missile applications of the strategic bombing system; the air defense system; tactical air systems; the Navy air mission, military logistic system; commercial air transport system (land-based), both passenger and freight; commercial air transport system (water-based), both passenger and freight; nuclear products; and electronics.

If an idea does not fit into these basic areas, it usually is rejected. The long-range planners also consider suggested shifts in the 10-year plan.

▶ **Idea Origins**—Where are new ideas found? A weapons-system analysis group is at work in each division taking a long-range look at military requirements. A consolidated report of their evaluations is furnished to the LRP office each month. That is one source.

Preliminary design, or other engineering sections, may come up with suggestions. Customers, both military and commercial, pass along requirements. Suggestions come from individuals inside and outside the company. Planning by top management sometimes results in new proposals.

Then, of course, there is the Long Range Planning Office itself. Proposals originating from this office are referred to the appropriate division for preliminary evaluation. Lanphier's staff makes its recommendation to the president only after receiving this evaluation.

In all its activities the planning staff depends largely upon personal contact with paperwork kept at a minimum.

It is a good bet that when Lanphier wound up his recent session with Gen. LeMay he had developed some leads which will help Convair in formulating its long-range bomber plans to the best interest of SAC. It is an equally good bet that he left a thought or two with the SAC Commander as to how Convair aspires to contribute technically to the SAC mission in years to come.

For Lanphier believes firmly in the exchange of ideas. That, he says, is the main job of his unusual department.

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Aerial assault on disease

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Bell Helicopters enlisted for war on malaria in Colombia

Across Colombia's steaming jungles and towering mountains, ten Bell 47G helicopters are waging a lethal dusting campaign against the malarial mosquito. Operating over incredibly rough country, dependability of both aircraft and engines is a crucial need. The world-wide service record of Franklin-powered Bell helicopters, coupled with the Colombian Air Force's experience with five similar ships, dictated the choice for this challenging assignment.

Bell is not alone among helicopters depending on Franklin engine performance. Four out of the five CAA-certificated helicopters under 400 h.p. — over 75% of all the helicopters flying today — are Franklin powered.

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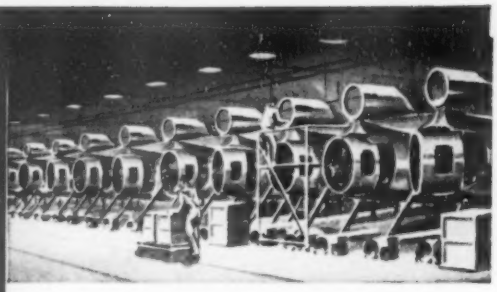

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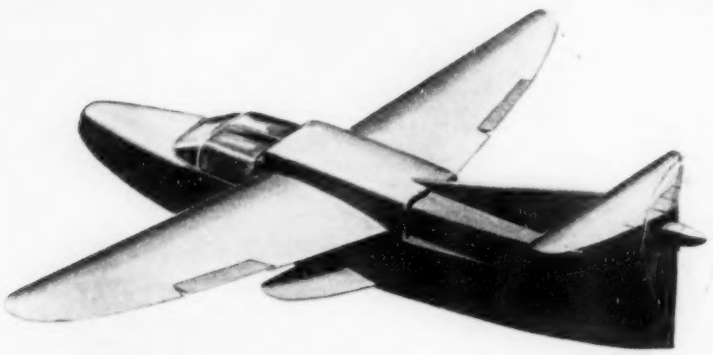

New Wing Cleans Amphibian Lines

A free-floating variable-incidence wing is one of the unusual design characteristics of a pair of proposed amphibian aircraft planned as a private venture by a veteran aircraft engineer.

Hillis Peterson of Wantagh, N. Y., told Aviation Week his aim was to avoid the poor aerodynamic lines, high centers of gravity and high thrust lines that have handicapped amphibious aircraft in the past.

He has done this, he explained, by using variable incidence to produce high wing lift independent of hull angle of attack. This avoids high hull angles for landing and takeoff, which dictate sweepup of the afterbody, and also eliminates the stepped hull.

Furthermore says Peterson, the wing design is inherently stallproof.

Paired Proposals

Both aircraft are aimed at the private-owner market for utility aircraft.

- P-A-2 is a two-place single-engine monoplane using a pusher propeller and featuring a stepless hull with sponson flotation. Design gross weight is 1,800 lb. Cruise speed at sea level has been estimated at 141 mph.
- P-A-3 is a four-place jet plane of similar aerodynamic design, powered by a light turbojet engine. Weighing in at an estimated maximum of 3,780 lb., this version could be expected to cruise at about 205 mph. at sea level.

Peterson has not estimated the cost for either model, preferring to wait until experimental prototypes have been built before hanging a price tag on the ships. But he has estimated that the first prototype P-A-2 could be designed, built and carried through flight testing for about $125,000 by a small project group of five designers and craftsmen working with minimum overhead for about 18 months.

The propeller-driven amphibian has received most of Peterson's attention; its jet-driven development has been only a tentative design conception.

Wing Details

Heart of both proposals is the unusual wing design. It differs from the conventional concept of a variable-incidence wing in two points:

- Each panel is free to move independently of the other; axis of rotation is spanwise, on the chord plane, and just ahead of the most forward center of pressure.
- Each panel is servo-controlled by a tab at the trailing edge; the pilot's control column actuates the tabs, which in turn control the motion of each panel.

According to Peterson, this method will permit the hull to assume its most natural trim angle with respect to either air or the water surface. By moving only the wing instead of the hull-wing combination to get takeoff angles of attack, he is able to avoid the need for upsweeping the hull afterbody.

A water takeoff can be made with the wing in minimum drag position for most of the run; on reaching takeoff speed, the stick is pulled back, the wings move to a high angle of attack and the aircraft lifts off the surface.

The Structure

Peterson expects to build the hull of molded resin-bonded fibrous glass, with internal bulkheads bolted into molded attachment points. The wing panels, tabs and tail are visualized as conventional designs in aluminum alloys.

The engine—a Lycoming 125-hp. model—is to be buried in the hull and will drive the propeller by an extension shaft. A cooling fan, similar to those proven in helicopter practice, will also serve as a flywheel to smooth out engine vibrations.

Landing gear is tricycle and retractable manually. Main wheels will have brakes. The water rudder retracts into the base of the air rudder and will be controlled by the same system.

Cockpit seats two and is conventionally equipped. The control column is rigged for throwover to either seat, and dual rudder pedals are installed. Insulation and soundproofing are used.

Control System

Unison or differential motion of the wing panels provides lateral and longitudinal control for Peterson's proposals. Motion of the control column moves a large servo tab which is on the wing-panel trailing edge at about the midspan.

When the tab deflects upward, the wing trailing edge is forced downward, increasing the lift of the panel; the opposite action also occurs. In differential operation, rotation of the control wheel will decrease deflection on one servo tab and increase it on the other.

As the wing panels approach the stall, the center of pressure moves back toward the mid-chord point, increasing the pitching moment by a factor of about 10. As this happens, the tabs are overpowered by the negative lift moment and cannot force the panel position to the stalled angle of attack.

In addition, separation of air over the top of the wing near the stall will decrease tab effectiveness, and further guarantee that the panels will not be forced to the stall point.

Stability

No pitching can be transmitted to the hull by the wings, because of the free-floating feature of the panels. Conversely, no hull pitching can show up in the wings.

So Peterson has been able to design the horizontal tail just large enough to provide pitching stability to the hull and to handle normal trim. Hull and wings fly independently of each other; tabs control the wing attitude, and the tail controls the hull angle.

Lift and drag forces can be resolved into a single force vector applied to a fixed point on the hull. Peterson says this method of control is very similar to the balance of

H. S. Peterson has about 20 years of aircraft design experience under his belt. After graduation from New York University, he worked for Grumman, Republic, Spencer-Larsen, Higgins Helicopter, and currently is chief of aerodynamics with East Coast Aeronautics, Inc. He is an Associate Fellow of the Institute of the Aeronautical Sciences.

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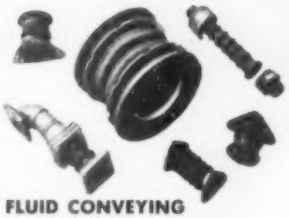

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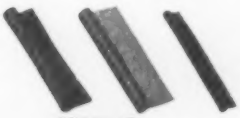

SEALING
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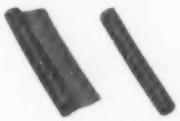

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FYRE-TITE ducts and couplings will withstand emergency temperatures as high as 2000°F.

FLO-FLEX fluid connectors are resistant to aircraft fuels, oils and other fluids. They retain flexibility and withstand vibration, elongation, compression, misalignment and torque motions at −65°F. Installation does not require gaskets or seals.

FRIGI-FLEX seals are designed for canopy, hatch and other aircraft closures requiring compression type seals. They retain their resilience over a temperature range of −125°F. to +500°F.

FYRE-TITE Seals for firewall application are fire-proof when subject to 2000°F. flame. They resist engine fuels and lubricants and retain resilience over a wide temperature range.

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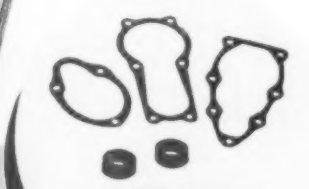

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Performance

For the P-A-2 prop-driven amphibian, Peterson has calculated these performance figures:

Maximum speed at sea level, 152 mph.; cruise speed using 80% normal rated power, 141 mph.; stalling speed, maximum gross weight, 56 mph.

Sea-level rate of climb has been estimated at about 985 fpm.; service ceiling is 17,300 ft. and absolute ceiling is 19,200 ft.

Takeoff distance from a hard-surfaced runway has been calculated to be 985 ft.

Performance figures for the P-A-3 jet job show these values:

Maximum speed at sea level, 251 mph.; cruising speed at sea level, 205 mph.; stalling speed at maximum gross weight, 70 mph.

Range is figured at about 500 miles, and the endurance at cruise speed as 2.5 hours.

Georgia Tech Gets Martin Endowment

The Martin Aircraft Scholarship Fund has been established at Georgia Institute of Technology by two top executives of the Maryland aircraft company.

G. M. Bunker, board chairman and president of the Glenn L. Martin Co., and J. B. Wharton, vice-president in charge of finance, made available an endowment of $16,000 for full-tuition scholarship grants for freshman cooperative students from Maryland and the District of Columbia.

These students, like others under the cooperative plan, will alternate every quarter between study at the Institute and a work period at Martin or other participating firms. They complete eight quarters in the four-year period of the cooperative plan, and then stay at school for a complete fifth year.

First award will be made to an entrant from the 1954-1955 academic year, with preference given to residents of Maryland or the District of Columbia, and special consideration given to eligible sons of employes of the Martin company.

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THRUST & DRAG

A new approach to English for engineers has been introduced at Rensselaer Polytechnic Institute, and it seems like a good idea. Students will be taught how the language operates and how it is used; semantics and logic will be part of the course.

The aim: to make engineers more discriminating as readers and more understandable as writers.

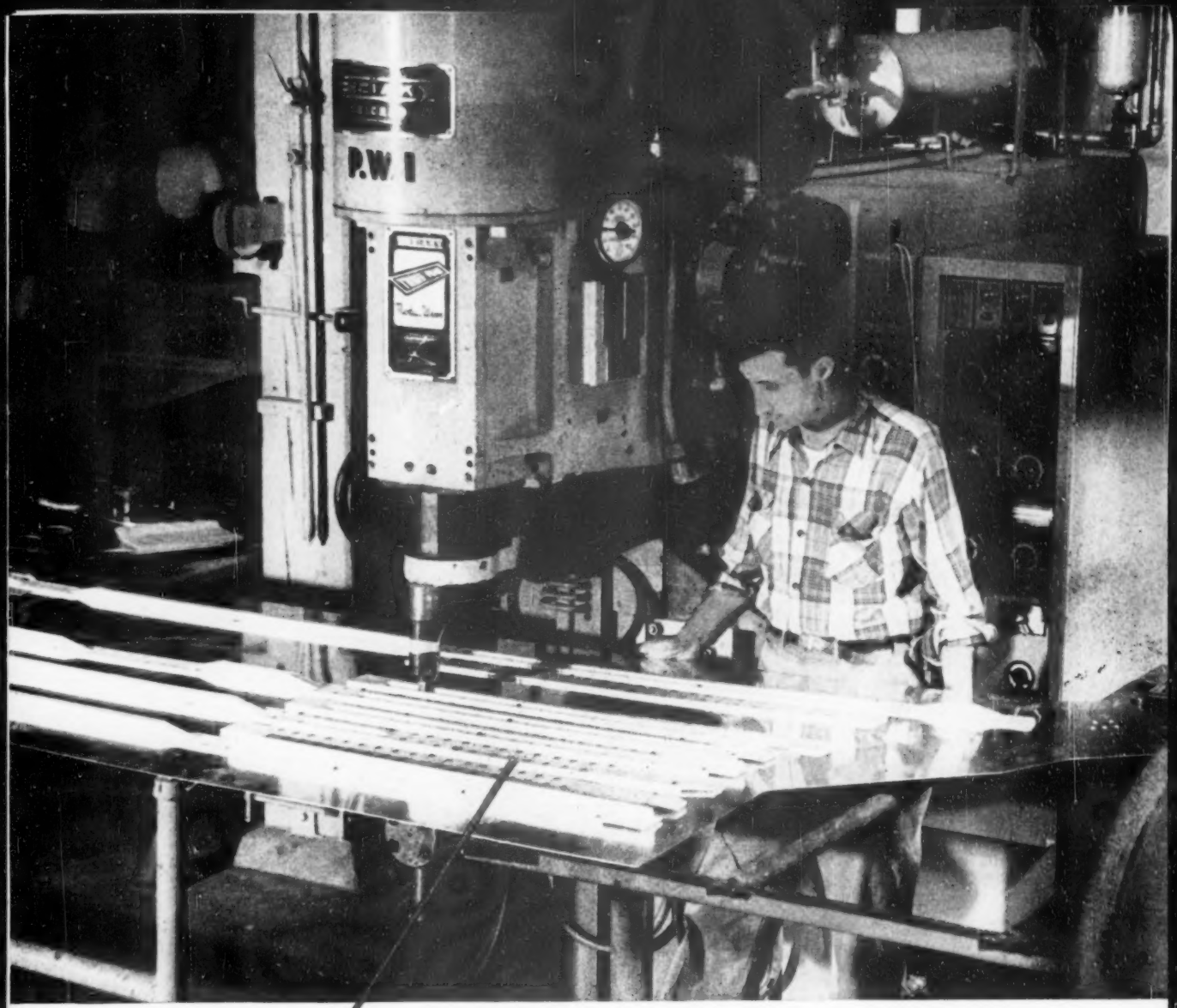
No more will the frosh have to labor—as this one did—through Victorian literature. For a change, they'll be able to read and dissect reporting, ad copy, speeches and regulations instead of wading through the ponderous phrases of the writers of the late nineteenth century.

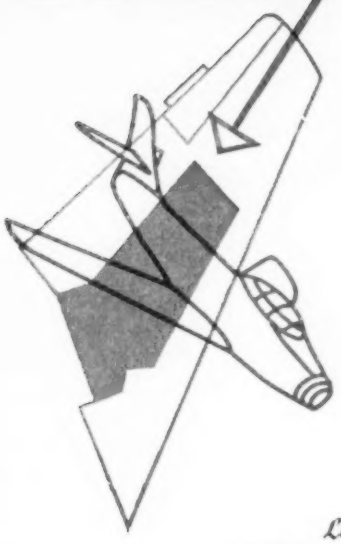
This teaching method seems to typify trends in engineering education toward the more informal and more useful study aids. RPI isn't alone in the field; if you haven't done it lately, look at the current catalog for your alma mater. The changes in curriculum probably will amaze you.

That's as it should be. Engineering is a rapidly expanding field, and education methods must keep even with the motion. Specialized courses, cooperative plans with industry, seminars, field trips are a vital part of the engineering student's education.

Another thought: It's getting near reunion time. When you go back to the campus, take time out to talk about educational methods with some of the profs. They'll want to hear your ideas, and you'll enjoy hearing theirs.

—DAA





Spotwelding .240 75st Aluminum Stringers to .081 75st Clad in Wing Section on F-84-F

These heavy section stringers are a Republic design improvement in wing structure of the battle proven F-84-F Thunderjet. This instance of improved design with resistance welding is not unusual — Republic design engineers are specifying five times more resistance welding in wing assemblies and three times more in fuselage assemblies than ever before.

The advantages of resistance welding in both airframe and jet engine fabrication are well known, Aircraft and Military specifications are most easily satisfied and maintained by Sciaky patented Three-Phase welders. That's why approximately 90% of all the resistance welding in airframe fabrication is done on Sciaky machines. Write for Bulletin 134ST for information on Sciaky Type ST aircraft welders.

The Sciaky Type ST welder shown above is one of many at Republic proving in daily production Sciaky's basic thinking of machine design to do *more useful work* at *lowest operating cost* with *maximum reliability*.

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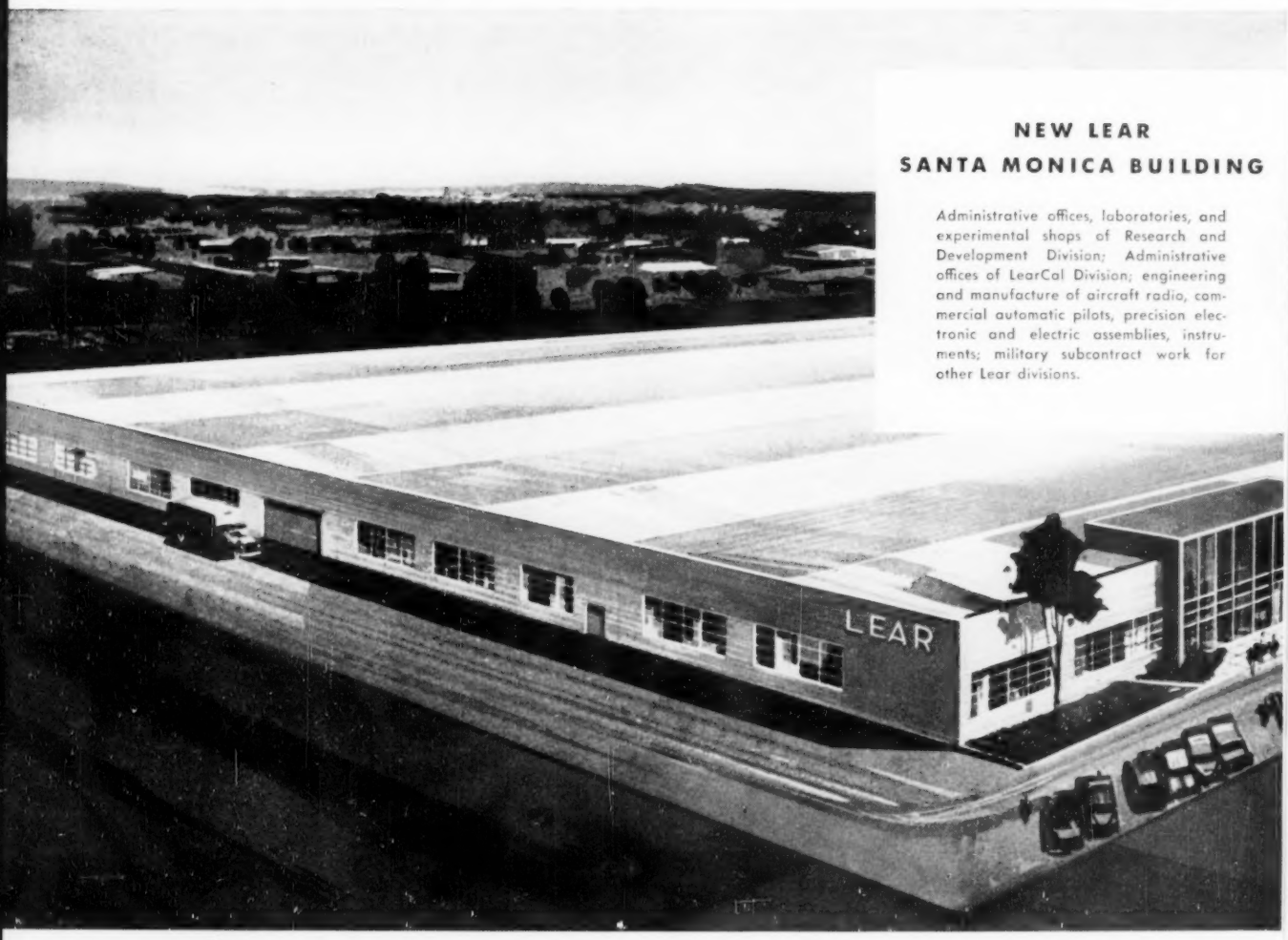

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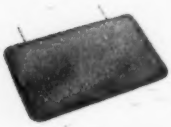

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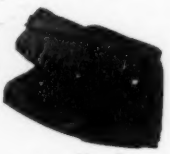

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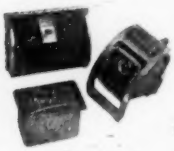

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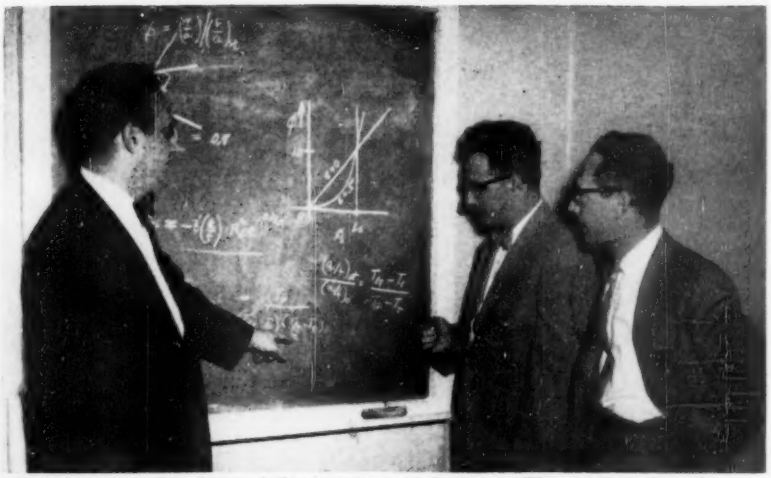

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They Sell Analytical Engineering

By David A. Anderton

Analytical engineering, the common denominator in the solution of widely different technical problems, is the stock-in-trade of Arde Associates, a group of consulting engineers and designers with offices in Newark, N. J.

Under the direction of Dr. Charles G. Sage, the 40-man organization– with about 30 of its staff graduate engineers –has tackled such diversified problems as the complete redesign of a heavy field artillery rocket, transpiration cooling for a jet engine, the design of vibration- and blast-proof structures, and structural analysis of nuclear reactors.

"We use a sound basic engineering approach with specialized techniques for special problems," says Sage. "Most of our work is in heat transfer, vibrations and stress analysis, but we believe we can tackle a technical problem in any field of analysis."

▶**Typical Job**–One example of how Arde works: They were called in to solve a complicated vibration and stress relation involving internal aerodynamics in a nozzle. The first approach–an analytical one–showed that there were too many variables to permit any kind of a solution, but that probably a dynamic model study would provide the answers they are seeking.

The model was designed, built and tested; the problem was solved.

In theoretical work, Arde has extended the literature of heat transfer specifically for a thermocouple used to measure gas temperatures. In use, thermocouples are shielded to prevent radiation from affecting the temperatures they are measuring. Knowledge of the behavior of the shields would let a technician apply a known correction to measured temperatures. Arde has solved that problem for the general case of any number of shields.

In other work, Arde has evaluated problems to determine whether expensive computer time should be bought for the complete answer, or if there is some simpler, approximate solution.

"But in spite of the highbrow analysis, our end product is engineering data," Sage points out. "We give the designer data he can use to apply to hardware."

▶**Engineering Shortage**–One of Arde's selling points is the engineering shortage. With a flexible organization, and what they feel is a unique approach, Arde is in a position to shoulder some of the engineering workload of industry.

The firm has completed assignments for Curtiss-Wright, Lockheed, Douglas, Westinghouse, Alleghany Ballistic Lab and the Atomic Energy Commission.

The men who form the nucleus of Arde have a common background in the Special Project Dept. of the M. W. Kellogg Co. where they had worked on the design of liquid and solid rocket motors and components.

When that work was canceled, they turned their talents in high-energy heat transfer and the other peculiarities of rocketry to a new approach to the engineering shortage.

▶**Basic Reasons**–Sage and the men with him felt that by being consultants, they could use their specialized knowledge to best advantage for themselves and prospective customers. But as Sage put it, "We didn't want to be the ordinary consultant who comes in once a week and looks at the problem. We wanted to take on a job and come up with design data."

The more they studied the problem, the more they felt that fundamental engineering was the best product the

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into the Wild Blue Yonder

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Still using old-fashioned controls?

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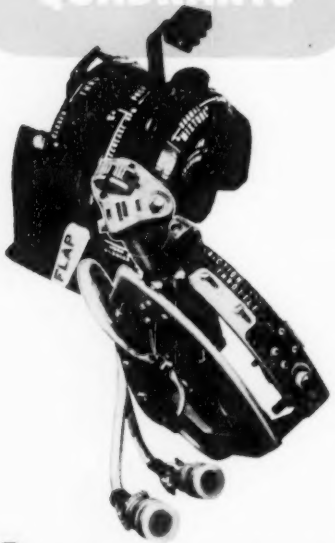

These and other quadrants have been developed by Adams-Rite to meet customers exact specifications.

We can design and build engine controls to *your* requirements for both piston and jet engine airplanes.

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ADAMS-RITE MANUFACTURING CO.

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Canadian Representative—Railway and Power Engineering Co., Montreal. Offices throughout Canada.

group could sell. This was the reasoning behind the final decision to offer that product.

Arde engineers believe that most of the solutions offered for the engineer shortage are long-term items. Changes in college curricula, for one example, would take at least two years and more generally four, to be noticed in the capabilities of new graduates.

On-the-job training has proven to be another long-term project. The trouble with it is that when a company has a problem, it exists now, and the answer is needed now, not when the next class of junior engineers graduates.

Cut-and-try engineering, or "cookbook" formulas aren't the right answer, according to Arde's staff. You generally get two results from that kind of an approach: The lack of time works against an optimum solution, and the company ends up building one-of-a-kind items which eventually are scrapped for something better. This is expensive and time-consuming.

▶**The Alternative**—Against these three common suggestions for living with the engineering shortage, Arde believes that the only alternative is analytical engineering. They approach a problem with fundamentals, where standard formulas and solutions still must be worked out.

A look around the office of Arde Associates shows the emphasis on analysis. The staff is preponderantly engineering graduates, physicists and mathematicians. Their past experience has included work in aircraft, missiles, thermal jet engines of all types, pressure vessels, mechanical gadgetry, new machinery, controls and instrumentation.

Sage was project manager for Kellogg in charge of design and development of liquid-propellant boosters and solid-propellant rocket cases.

Benjamin Aleck, Arde technical director, was head of the Kellogg design division, supervising booster powerplant design for Terrier, Talos, Sparrow, Honest John, Rigel, Meteor and Snark missiles.

David Ehrenpreis, Arde project engineer, previously worked in structural design of buildings and bridges, including a special set of test structures at Eniwetok designed to yield at different percentages of atomic blast pressure loading. Ehrenpreis now is the company's analytical trouble-shooter who works the entire field of stress analysis and vibrations.

Ernest Mayer, physicist experienced in X-ray investigations, specializes in heat transfer, gas dynamics and special mechanical stress problems.

▶**Work Load**—Arde's current work load is negotiated almost entirely on a non-competitive basis, with payment for time and material.

The firm tries to maintain a permanent organization, not a job shop, according to Sage. The group is organized on a project basis, with key men floating from one job to another.

Sage points out that Arde personnel are comparable to the average college consultant. "But we feel that we can offer more, because we are equipped to design, develop, build and test any special hardware required for the job."

So far the Arde formula has been working. The firm has grown slowly but continuously, and it now can count between six and a dozen projects in the mill at any one time. Sage says that the diversification of jobs makes recruiting easier, and adds that Arde can provide interesting jobs directed by supervisors who know more than the men they are leading. "This is a good atmosphere for engineers," says Sage.

"There's one other important point," says Ben Aleck. "We can't afford to make mistakes. Everything we do shows."

More Muscle for SAC

Final assembly bays at Boeing-Wichita show imposing array of B-47 Stratojet bombers destined for the Strategic Air Command. Plane in the foreground has bombing radome hanging under nose while interior work progresses. Crew entry is directly aft. with ladder reaching inside. Doors for front landing gear and bomb bay are open. Rato bottle exhaust ports in fuselage are just behind wing area. Access doors on fuselage crown stretch in open position from aft of canopy to base of fin.

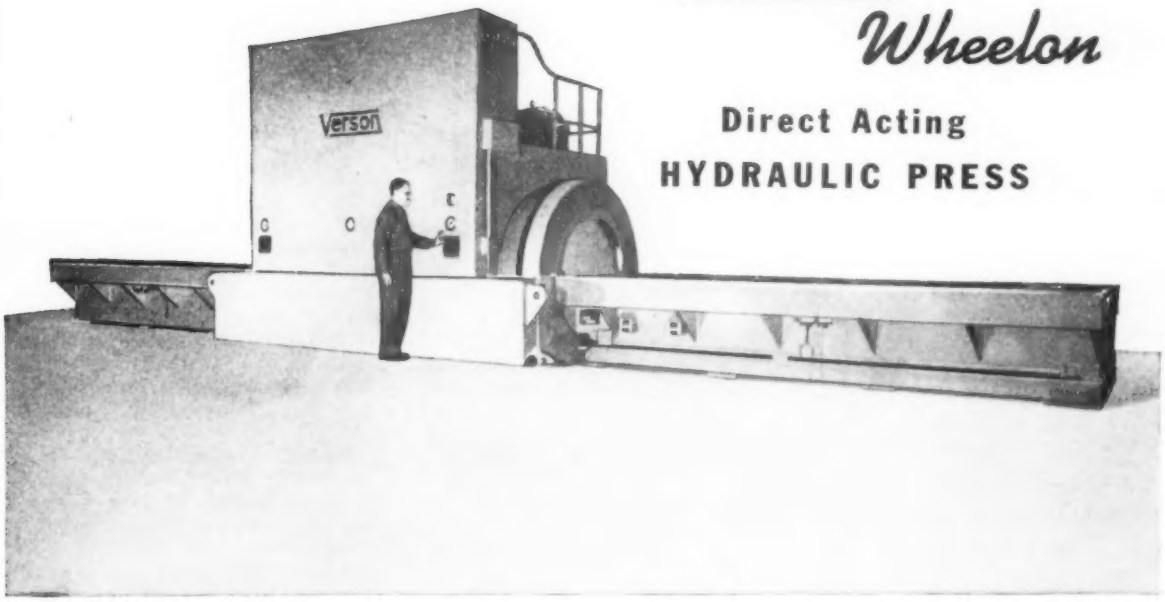
21,000 tons

of gentle, squeezing power in this

TRADE **Verson** MARK

Wheelon

Direct Acting
HYDRAULIC PRESS



The Verson-Wheelon Bulletin explains the simple operation of the Verson-Wheelon Press and shows examples of the work it performs. Typical specifications are also given. It is available on request.

Yes, this Verson-Wheelon Press has a capacity equivalent to a 21,000 ton rubber pad forming press. However, it does a better, more complete forming job than the rubber pad press; yet its cost is only a fraction of that of the conventional press.

The Verson-Wheelon Press illustrated operates at 5,000 psi. Its twin feeding tables are each 50" x 168" to handle long channels for a leading aircraft manufacturer.

If you are now doing or contemplating rubber pad forming, you should consider a Verson-Wheelon Press before you buy. Compare the price and compare the work—it's the best way to convince yourself of the economy of Verson-Wheelon forming. The bulletin described at the left gives full information. Write for your copy, today.

A Verson Press for every job from 60 tons up.

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- Production quantities
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- Higher efficiency
- Economy of space and weight
- Special gear materials

Vard INC PASADENA 8 CALIFORNIA

PRODUCTION BRIEFING

▶ **Grand Central Aircraft Co.**, Glendale, Calif., has received a contract for more than a half-million dollars from USAF to overhaul an undisclosed quantity of Beech C-45G twin-engine light transports. The work is expected to take approximately one year.

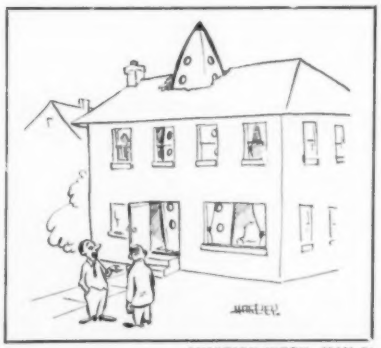
▶ **American Silver Co.**'s new Thermostat Metal Division, Flushing, N. Y., is now producing metal strip in coils or cut lengths in thicknesses of .001-in. and over, widths from 1/16th-in. to 5 in. with thickness tolerances as close as plus or minus .00015 in.

▶ **Beech Aircraft Corp.**, Wichita, will produce additional, sizable quantities of major subassemblies for the McDonnell F-101A Voodoo USAF jet fighter. This latest Voodoo production order amounts to some $2.5 million.

▶ **Irvin Chute Co., Ltd.**, Ft. Erie, Ont., has received a parachute order from the Canadian Dept. of Defense Production amounting to $500,000 to $600,000. The company is a subsidiary of Irving Air Chute Co., Inc., Buffalo.

▶ **Broadway Maintenance Corp.**, N. Y., has completed a $2-million electrical system in Grumman Aircraft Engineering Corp.'s new $20-million plant at Peconic River, Calverton, N. Y. The installation involves three miles of 66,000-v. transmission line, an outdoor 66,000-v. to 13,000-v. stepdown substation, 13,000-v. switchgear, twelve 13,000-v. indoor distribution substations and all interior lighting and power wiring.

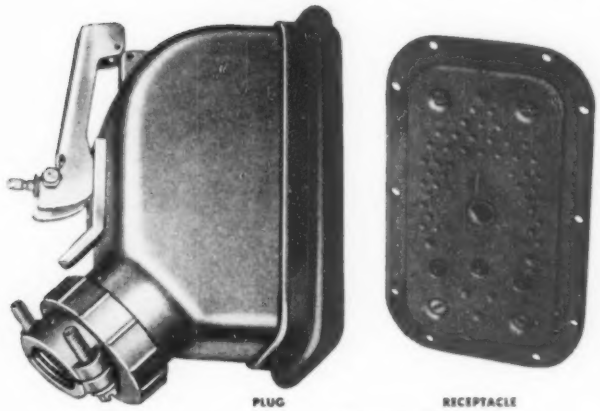
▶ **Meridan Corp.**, Chicago, Ill., has moved its executive offices to the Chicago Title and Trust Bldg., 111 W. Washington St. The firm's principal operating division is Flex-O-Tube of Detroit, manufacturer of flexible hose.

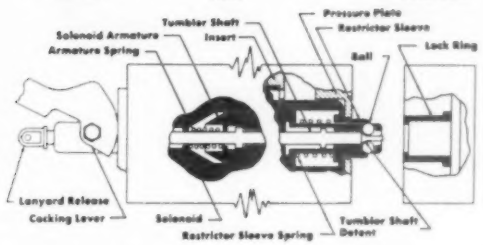


AVIATION WEEK, MAY 31

"I just said to myself, if the Wright brothers could do it in a bicycle shop, I can do it in my cellar."

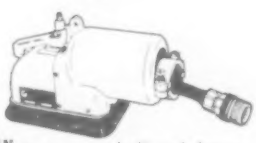
for guided missiles... CANNON PLUGS





Cannon's Type GMA Plug and Receptacle, equipped with 45 degree endbell. Available either with remote solenoid disconnect mechanism or manual lanyard release. A ball-and-detent type breakaway plug, accommodating from 41 to 140 contacts, ranging in wire size from 0 to #16.

Cannon's type "GM" Guided Missile Connectors, available in more than 10 basic shell designs and a wide variety of disconnect systems, are engineered for guided missile launching under ordinary and hazardous conditions. Built for heavy service duty with shells of durable aluminum alloy and inserts of melamine or laminated phenolic, these sturdy connectors have a maximum current rating of 200a and a nominal flashover value of 5,000v, more than 22 contact layout arrangements accommodating from 8 to 140 contacts. Co-axial, thermocouple or high-current-capacity contacts are available. Many types of Cannon Plugs are used in rocket and missile components. The "GM" Series extends Cannon's policy of complete and comprehensive connector service into the launching phase of guided missile development.



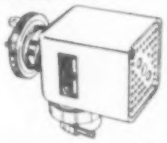
GMAN type . . . ball-and-detent latch . . . lever actuated engagement . . . solenoid or manual release . . . high current contacts and 90 degree angle endbell. Two contact layouts.

GMC type . . . ball-and-detent latch . . . handwheel actuated engagement . . . remote solenoid or manual disconnect . . . equipped with 45 degree endbell. Three contact layouts.

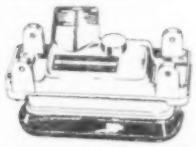
GMD type . . . sled-and-skid type connector for rack launching . . . skid-way type disconnect . . . longitudinal mounting brackets . . . 60 or 90 degree endbells. Two contact layouts.

GMDA type . . . sled-and-skid type connector for rack launching . . . lateral mounting brackets . . . skid-away release mechanism . . . straight or 60 and 90 degree endbells. Six contact layouts.

GMDD type . . . sled-and-skid type connector for platform launching . . . straight endbell . . . longitudinal mounting ears . . . 22 size 14 contacts. One contact layout.



GME type . . . ball-and-detent type latch . . . handwheel engagement . . . manual release only . . . handwheel equipped with ears for clevis . . . 90 degree angle endbell. Seven contact layouts.



GMJ type . . . sled-and-skid type connector for platform launching . . . manual fall-away disconnect . . . mounting ears fitted on rear . . . 30 degree angle endbell. One contact layout.

GMK type . . . ball-and-detent latch . . . handwheel engagement . . . with or without ears for clevis . . . manual release only . . . 90 degree angle endbell. Two contact layouts.

GME type . . . ball-and-detent latch, handwheel actuated engagement, manual lanyard release only. 90 degree endbell. One contact layout.

Refer to Dept. 110

CANNON ELECTRIC COMPANY, 3209 Humboldt St., Los Angeles 31, California. Factories in Los Angeles; East Haven; Toronto, Canada; and London, England. Representatives and distributors in all principal cities.

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In addition to the "GM" Series, Cannon Types "AN", "K", "DPD", miniature connectors, and the J06 are used for missiles and jettisonable equipment. For an overall survey of these, request your copy of the "Cannon Plug Guide". For complete engineering data on the "GM" rocket launching connectors request the "GM" Bulletin on company letterhead.

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Credit *Link* Engineers for designing and producing the latest, most complex and precise jet training mechanism in the world — the *F-89D Jet Flight Simulator!*

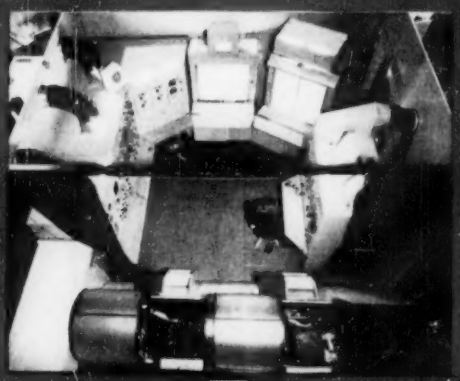
Capable of duplicating *exactly* the in-flight characteristics of the Air Force's new all-weather interceptor — the twin-jet Northrop Scorpion — the F-89D Simulator represents another milestone in the twenty-five year history of Link *Precision Engineering.*

IN THE AIR . . .

The Northrop F-89D Scorpion wings through its paces.

ON THE GROUND . . .

Link's training version of the F-89D with tandem cockpits in the foreground and flight and radar instructors' area in the rear.



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LINK invites employment applications from engineers and draftsmen.

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Ingersoll-Rand Co., 2037 Chestnut St., Philadelphia 3, wrench, impact, pneumatic, 725 ea., $69,564.

Iowa Paint Mfg. Co., Inc., 118 Eighth St., Des Moines, paint, titanium-lead-zinc, 20,000 gal., $42,386.

M. B. Mfg. Co., Inc., 1060 State St., New Haven 11, Conn., maintenance parts for use on various aircraft, $363,025.

Manley Div., American Chain Cable Co., Inc., 1100 E. Princess St., York, Pa., hoist, bomb aero 14B and cable assys., $61,401.

Nycel, Inc., 6030 N. Sheridan Road, Chicago 40, dope, cellulose nitrate, 47,540 gal., $53,483.

Rhodes Lewis Co., 6151 W. 98th St., Los Angeles 45, motor assy., 67 ea., $34,578.

Frank G. Schenuit Rubber Co., Railroad & Union Ave., Baltimore 11, 14 items for tires and tubes, $365,659.

Scintilla Div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., maintenance parts for various aircraft engines, $148,526.

Simmonds Aerocessories, Inc., 105 White Plains Road, Tarrytown, N. Y., amplifier, 285 ea., $43,652.

Studebaker Chemical Co., Vulcan St., Elyria, Ohio, compound, rust-arresting, 21,000 gal., $27,771.

Pratt Whitney Aircraft Div., United Aircraft Corp., East Hartford 8, Conn., parts for P&W engines, $43,158.

United States Rubber Co., 6600 E. Jefferson Ave., Detroit 32, 17 items for tires and tubes, $749,788.

Westinghouse Electric Corp., 3001 Walnut St., Philadelphia 4, spiders used on actuator bearing, $37,182.

Willis Geiger, Inc., 51 W. 21st St., New York 10, vest, life preserver, pneumatic, 9,800 ea., $162,624.

Air Associates, Inc., Teterboro, N. J., clutch frame and sprocket assys., $76,992.

Airborne Accessories Corp., 1414 Chestnut Ave., Hillside 5, N. J., actuators for various aircraft, $458,623.

Bertea Products, 1450 N. Lake Ave., Pasadena 6, Calif., items of valves and spare parts for AD aircraft, $220,689.

Continental Aviation Engr. Corp., 1500 Algonquin Ave., Detroit 15, maintenance parts for support of Continental R975-46 engines, $604,861.

Eddington Metal Specialty Co., Bristol Pike, Eddington, Pa., fuel nozzle J34 for use on aircraft, 1,600 ea., $288,960.

Fairchild Camera & Instrument Corp., Robbins Lane, Syosset, Long Island, N. Y., overhaul of govt. owned gun cameras, $26,600.

Grimes Mfg. Co., 515 N. Russell St., Urbana, Ohio, light, gasket, cover and spare parts, $49,343.

Grumman Aircraft Engineering Corp., Bethpage, Long Island, N. Y., vandyke drawings and revisions, $32,840.

Hazeltine Electronics Corp., 58-25 Little Neck Parkway, Little Neck, Long Island, N. Y., modification kit and switch box, $79,236.

Hydro-Aire, Inc., 3000 Winona Ave., Burbank, Calif., maintenance parts for various aircraft, $25,842.

Ingersoll-Rand Co., 2037 Chestnut St., Philadelphia 3, compressor, air-portable, gasoline-engine-driven, $181,640.

Thomas Laughlin Co., 143 Fore St., Portland 6, Me., turnbuckles, wire rope, galvanized forged steel, $27,538.

Lear, Inc., 110 Ionia Ave., N.W., Grand Rapids 2, Mich., reproducible copy, offset negatives, revision pages and handbooks, $47,472.

Met-Pro, Inc., 5th Mitchell Ave., Lansdale, Pa., engine change stands, $36,127.

Philco Corp., 4700 Wissahickon Ave., Philadelphia 44, control box, 1,546 ea., $26,081.

Reliance Chemical Co., Lee Terminal, Standiford Field, Louisville, Ky., acetone, $49,354.

Shell Chemical Corp., 380 Madison Ave., New York 17, N. Y., ketone, methyl ethyl, $26,310.

Simmonds Aerocessories, Inc., 105 White

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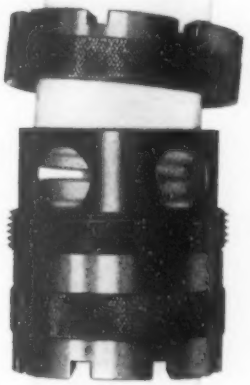
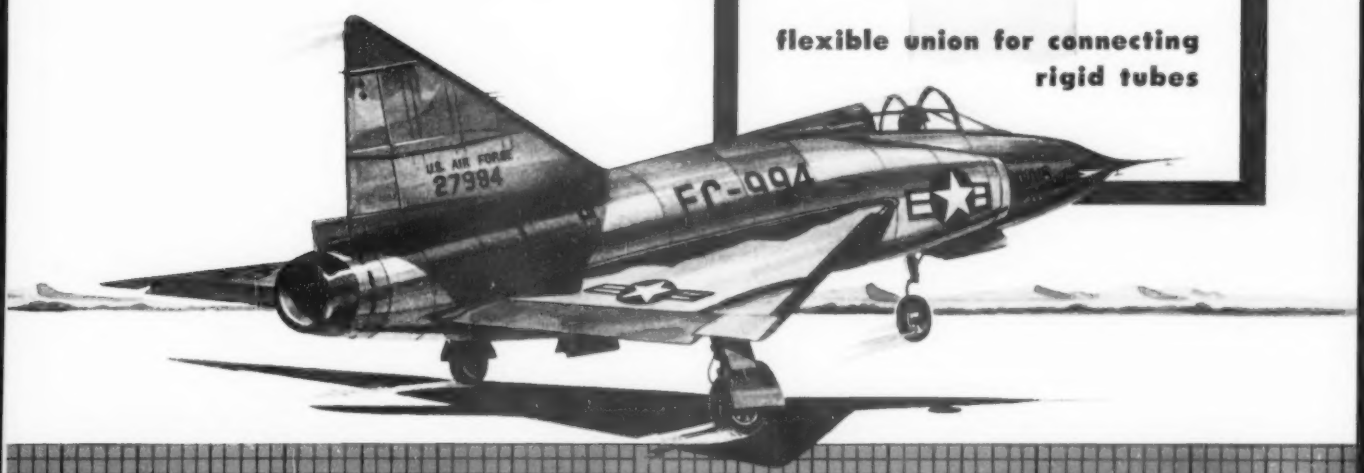
WIGGINS COUPLINGS SAVE 49 POUNDS ON CONVAIR F-102

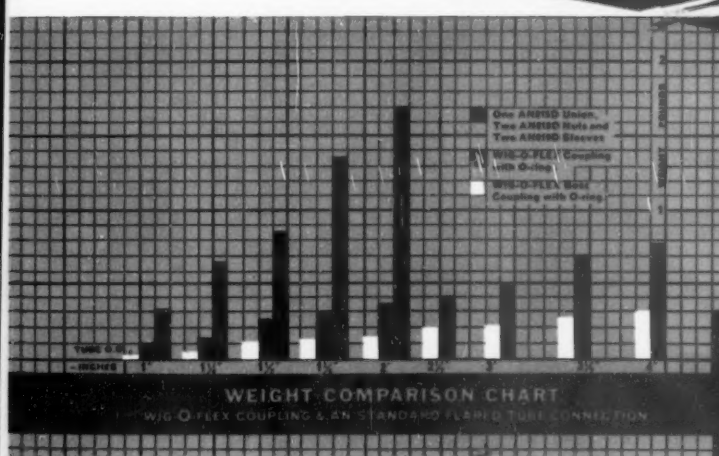
The new CONVAIR F-102 is 49 pounds lighter because WIG-O-FLEX Couplings replaced standard AN connections and cut hose. We are gratified that engineers at CONVAIR—the company that prides itself on Engineering to the Nth power—chose WIG-O-FLEX Couplings for a plane where weight was a major problem. The WIG-O-FLEX Coupling weighs 1/5 as much as the standard AN connection it can replace. (See weight chart for exact comparisons.)

WIG-O-FLEX COUPLING



flexible union for connecting rigid tubes




One AN815D Union, Two AN818D Nuts and Two AN819D Sleeves
WIG-O-FLEX Coupling with O-ring
WIG-O-FLEX Boss Coupling with O-ring
WEIGHT
POUNDS

WEIGHT COMPARISON CHART
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- Withstands more than 1000 psi burst pressure.
- Accommodates 4° total flexure.
- Installs locally. 80% lighter.
- Temperature range —65°F to +250°F.

SIZES: ¼"-⅜"-½"-¾"-1"-1¼"-1½"-2"-3"-3½"-4"

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Edison's *new* fire detection system proves outstanding under the most rigorous performance conditions. For the research facilities of the world-famous Edison Laboratory—and unequalled experience now provide an aircraft fire detection system that meets *all* of the requirements for today's flying.

- **Simple, fool-proof operation** — a single wire centered in thermistor material with a grounded outer sheath — temperature sensitive at all points.
- **Exclusive power principle** — operates from primary battery supply — eliminates electronic tubes.
- **Adds almost negligible weight** — the control assembly tips the scale at only .8 pound—100 feet of sensing cable, at 1 pound.
- **Low impedance design** — to eliminate completely false alarms due to moisture or capacitive effects.
- **Responds within seconds** — signals "Fire Out" automatically — and responds repeatedly to fire exposure.
- **Exclusive snap clamps** — to allow simple installation — speed maintenance.
- **Varying temperature alarm points** — from the same detector circuit within a single cable loop — guarantees maximum sensitivity for each area guarded.
- **Vibration and shock resistant** — because there are no moving parts — no ceramic to crack in the easily flexed cable.

Won't you write us for complete data on this revolutionary development?

Thomas A Edison

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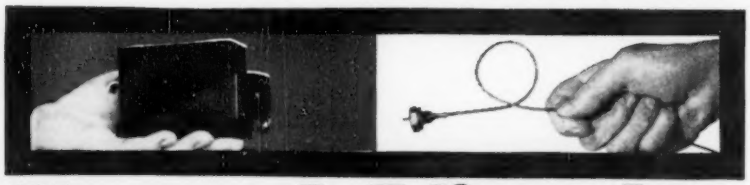


Thomas A. Edison, Inc.

INSTRUMENT DIVISION • 49 LAKESIDE AVENUE • WEST ORANGE, NEW JERSEY

Plains Rd. Tarrytown, N. Y., indicator; fuel quantity, 181 ea., $30,297.

Switlik Parachute Co., Inc., 1325 East State St., Trenton, N. J., parachute assys., $550,050.

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn., spare parts for various propellers, $19,408.

United Merchants Industrial Fabrics, 1407 Broadway, New York, N. Y., insulating material, $49,141.

United States Gauge Div., American Machine & Metals, Inc., Clymer Ave., Sellersville, Pa., indicator, 1,251 ea., $56,870.

BuAer Contracts

The following contract awards of $25,000 and more have been announced recently by the Bureau of Aeronautics, Department of the Navy, Washington 25, D. C.

LOCKHEED AIRCRAFT CORP., Burbank, Calif., kits of parts for installation of passenger seat headrests for model R7V-1 aircraft, 19 ea., $30,837.

LOUCKS AND NORLING STUDIOS, INC., New York, preparation of master shooting scripts with partial storyboards and production of (3) 35-mm. black and white sound, motion picture training films on the general subject of "Rapid-Fire Guns," to be entitled: (a) "6"/47 Rapid-Fire Gun and Turret" (U. S. Navy No. MN-9321a); (b) "8"/55 Rapid-Fire Gun and Turret" (U. S. Navy No. MN-93211b); (c) "16"/50 Gun and Turret" (U. S. Navy No. MN-9321c); $27,509.

WESTINGHOUSE ELECTRIC CORP., Washington, D. C., special tools and ground handling equip. to support model J40 engines being procured under separate contract; $100,000.

FRIEZ INSTRUMENT CORP., Bendix Aviation Corp., Baltimore, reproduction test model (modification of govt.-owned prototype indicator, model NAX-7-47), 1; aerological measuring sets, AN/PMQ-5, 25; pubs., dwgs., provisioning spare parts breakdown, $37,178.

BENDIX PRODUCTS DIV., Bendix Aviation Corp., South Bend, Ind., fuel injection pump test stand, 1, direct injection fuel pump run-in stand, 1, direct injection fuel nozzle test stand, 1, tool kit, 1, drawings; check installation and operation and indoctrinate responsible personnel at NAS, Alameda, $33,074.

DOUGLAS AIRCRAFT CO., INC., El Segundo, Calif., kits or parts (I, II, III) for installation of AN/APS-31B radar in model AD-4N aircraft, 263, $35,528; kits of parts for carburetor air temperature system for model AD aircraft, service bulletin 408, service change 349; 1,348 ea., $29,102.

GENERAL ELECTRIC CO., Schenectady, N. Y., starter generators, engine, aircraft, turbojet, type A-4, publs., vandykes, 479, $338,495.

NORTH AMERICAN AVIATION, INC., Downey, Calif., conduct a research and development program: (1) including experimental work to demonstrate the feasibility and practicability of measuring fuel quantity in a system of aircraft tanks by radiation techniques; (2) to investigate the feasibility of a radiation type gage system applied to all altitude requirements; reports, drawings, $69,652.

NORTH AMERICAN AVIATION, INC., Columbus, Ohio, repairs to crash-damaged model AJ-2P aircraft, $30,494.

SUMMERS GYROSCOPE, Santa Monica, Calif., gyroverticals, 200, mixer boxes, 200, elevator follow-up potentiometers, 200, servo output arms, 200, gyrovertical cables, 200, gyro-servo cables, 200, elevator cables, 200, follow-up cables, 200, spare parts, dwgs., publs., installation instructions, recommended list of overhaul and line maint. tools and test equipment, $279,254.

SIKORSKY AIRCRAFT DIV., United Aircraft Corp., Bridgeport, Conn., kits of parts for external store stations, armament and wire laying device and service bulletin included in each kit, for model HRS-3 helicopters, 13, $26,098.

J65 LINE at Curtiss-Wright's Aeronautical Div. provides turbojet assembly in vertical position (right), then jets go into horizontal stands for installation of accessories.

TURBO Compounds for commercial, military planes, roll down automated lines.

Wright Reveals Production Activities

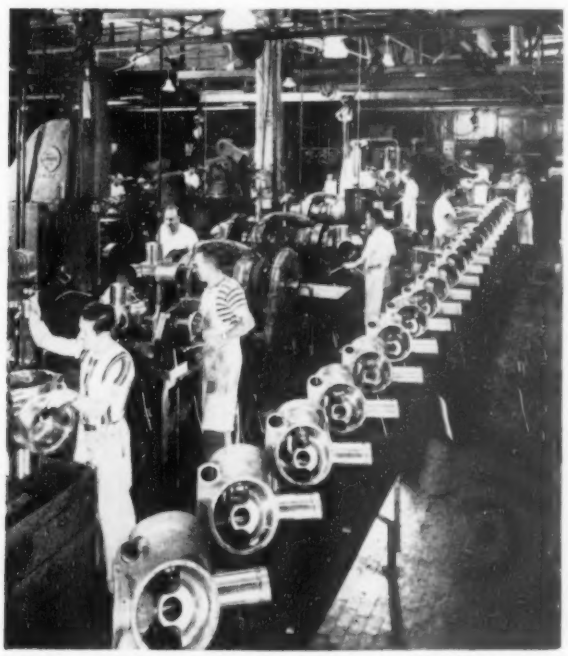
Curtiss-Wright Corp. did nearly $440 million business in 1953 and had a total backlog of unfilled orders and letter contracts Mar. 31 of $825 million. In addition to the engine and propeller activities shown in these photos, Wright's divisions and subsidiaries are engaged in a variety of aviation work.

• **Electronics Division** is now engaged in the construction of simulators, duplicators and radio aid units for airline operators and the military.

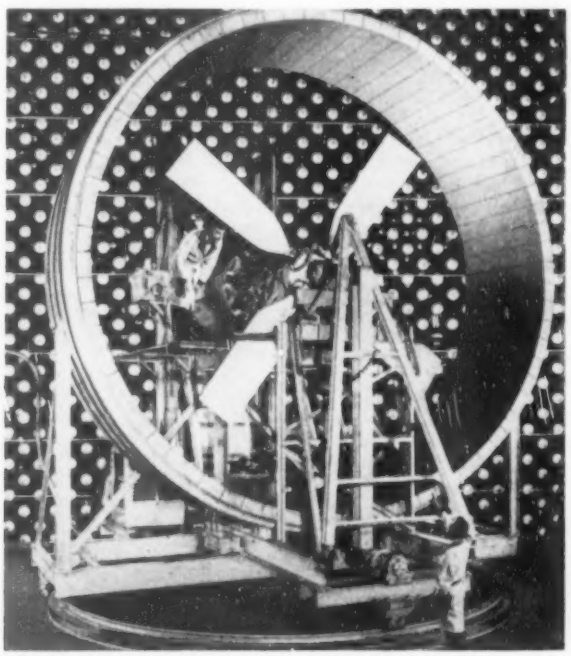
• **Metals Processing Division** operates a high-temperature alloy castings foundry, a forge shop and a machine shop. A 12,000-ton extrusion press will be added to this facility in the near future, housed in its own 101,600-sq. ft. building.

• **Marquette Metal Products Co., Inc.,** is now in production with jet engine pumps for the company's Wright Aeronautical Division.

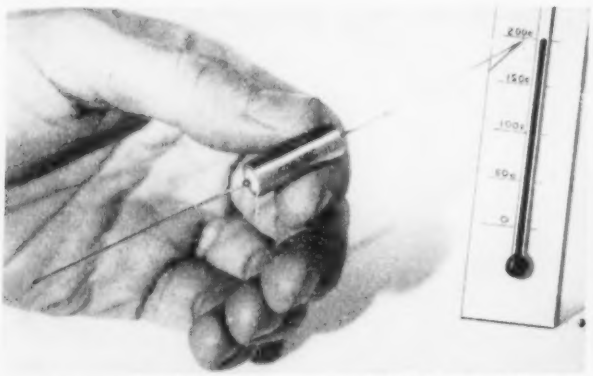
• **Caldwell Wright Airport, Inc.,** sells spare parts; services Wright engines for the military, airlines and private operators; conducts manufacturing activities; provides a service base and facilities for flight test and research by other divisions of the Curtiss-Wright Corp.



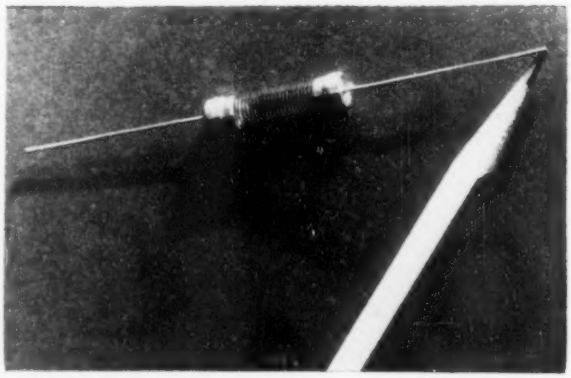
HUBS are made at Propeller Division for Turbolectric props such as found on Convair, Lockheed vertical-takeoff fighters.



GYROSCOPIC whirl rig tests type of Turbolectric prop to be teamed with Wright's T49 on jet-turboprop XB-47D.



CAPACITOR developed by Balco passes 10,000-hr. load-life test at 200C with flying colors. Company also makes . . .



PRECISION RESISTOR in which metal spiral is attached to inside of hard glass tube. Unit is hermetically sealed.

New Capacitor Shows Long Life at 200C

Balco's HT-2 capacitance units far exceed military specs; new glass-bonded precision resistors have no inductance.

By Philip Klass

A remarkable new capacitor, capable of operation for 10,000 hours at 200C temperatures without any voltage derating, should prove valuable to avionic equipment designers trying to break the "thermal barrier" encountered in missiles and highspeed aircraft. The capacitor's capabilities compare with present military specs which require only a 250-hour load-life test at 125C.

Developed by Balco Research Labs, Newark, N. J., the new HT-2 capacitor has characteristics which equal or exceed the best features of paper-type capacitors, and possibly mica, according to company figures. The new unit is now in limited production.

Balco also has developed a new type of compact, hermetically sealed precision resistor, featuring no inductance, high moisture resistivity, and good stability. The company says this will compete with existing deposited-film and wire-wound resistors in many applications.

▶ **Right at Wright**—AVIATION WEEK checked the phenomenal performance figures which Balco quotes for its new HT-2 capacitor with Wright Air Development Center's Electronic Components Lab, which sponsored the work.

The WADC project engineer said the center's tests of limited samples had confirmed Balco's figures. Furthermore, insulation resistance of some special units was so high that until very recently WADC had no equipment with sufficient sensitivity to measure it.

▶ **Performance Data**—Here are some of the figures which Balco gives for its new HT-2, compared with corresponding values for a high temperature capacitor made by Company X:

• **Temperature range:** (no derating): Balco, −70C to 200C; Company X, −65C to 150C.

• **Temperature stability:** Balco, No more than 2% change in capacitance between −70C and 200C; Company X, 17% between −50C and 150C.

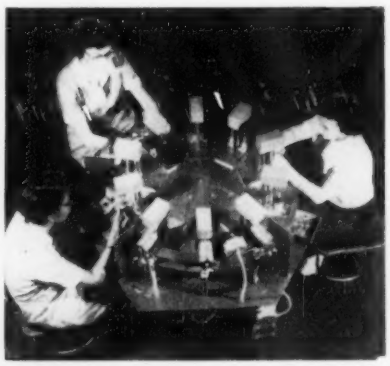
• **Insulation resistance:** Balco, Above 5 x 10^{11} between −70C and 180C, 5 x 10^{9} at 200C; Company X, 5 x 10^{7} per microfarad at 150C. (Balco units with an IR of 5 x 10^{14} are available on special order.)

• **Power factor:** Balco, 0.0005 between −70C and 180C, 0.002 at 200C over the frequency range of 60 to 10,000 cps.; Company X, 0.008 between −65C and 115C, 0.015 at 150C, based on measurement at 60 cycles. (Power factor normally increases with frequency in conventional capacitors.) Recent Balco measurements of power factor at 3.5 mc. show it to be lower than for mica units (0.000345 vs. 0.000495), company says.

• **Load-life tests:** Balco reports no deterioration in performance after 10,000 hours of load-life tests at 200C and 140% rated voltage. Company X subjects its units to only 250 hours of load-life test (MIL-spec limits) at 150C and 140% rated voltage. One failure per 12 units tested is considered acceptable, Company X says.

▶ **Long-Lived**—Out of a batch of 40 Balco capacitors which have been load-life tested continuously at 200-215C since September 1952 (approximately 13,000 hours), only one unit has failed

MACHINE for winding HT-2 high-temp. capacitors was developed by Balco.



HERMETIC caps are put on resistors with another Balco-developed machine.

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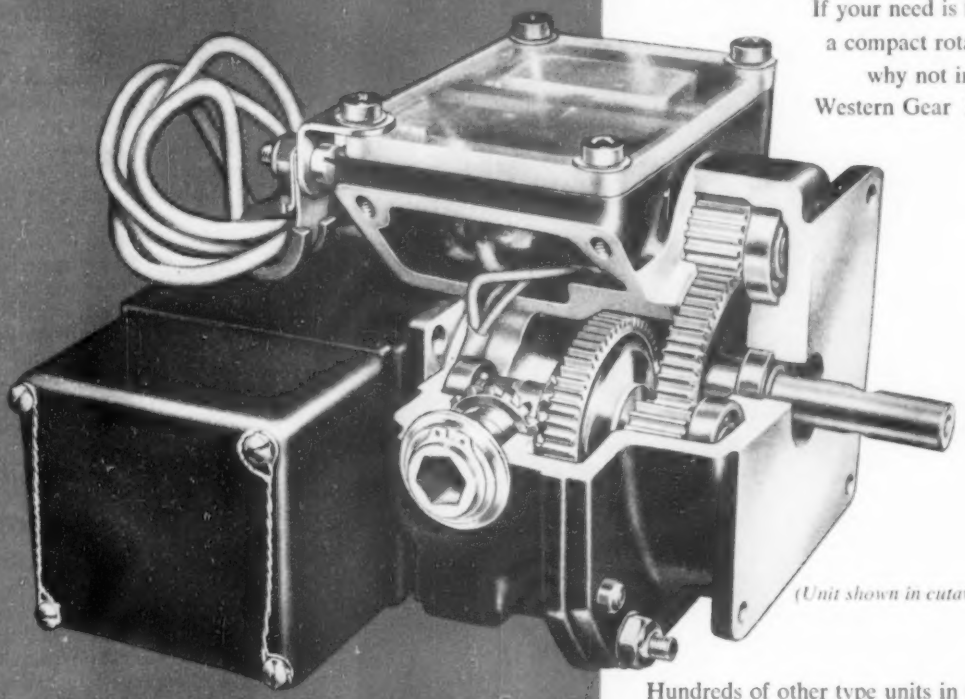

(Unit shown in cutaway)

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and that occurred during the first 24 hours of test, according to Dr. H. M. Thaxton who heads capacitor development.

Thaxton also showed AVIATION WEEK a batch of capacitors which he said had been under test at 240C for 30 days without any reported failures to date.

▶**Comparable Sizes and Prices**—The HT-2 is available in standard values of 0.001 to 1.0 mfd., working voltages of 200 to 1,000, with capacitance tolerance of 5% or 10%. Size of Balco's standard units is comparable to 150C capacitors made by other manufacturers, slightly larger in some instances. For example, a Balco 0.01-mfd. unit rated at 400 v. has the same diameter (0.312 in.) as the 150C unit made by Company X, and its length (1 in.) is only ⅛ inch longer.

Despite its advantages, the price of the new HT-2 in production quantities is about the same or only slightly higher than for Company X's 150C capacitor, Balco says. On special order, the new units can be supplied with slightly smaller dimensions, higher or lower capacitance, or with even higher insulation resistance, above 5×10^{14}, the company says.

▶**Under Wraps**—Balco is understandably secretive about the materials and techniques which give the HT-2 its amazing performance. Dr. Thaxton would only say that the dielectric used is a form of polyester material whose dielectric constant can be varied within certain limits during manufacture. Development work on the HT-2 was started almost three years ago.

Capacitor manufacturing facilities are located behind closed doors in a separate room in the Balco plant. The door was opened for approximately two seconds to give AVIATION WEEK a quick and distant look at the capacitor machines.

▶**Insulation Resistance**—Unlike other capacitors, the insulation resistance of the HT-2 is expressed in values independent of the unit's capacitance. The reason: Its internal insulation resistance is so high that the leakage across the glass end-seal determines the effective IR of the capacitor.

If Balco could find a commercially practical end-seal material with less leakage at high temperature (above 180C), it could boost the overall IR of its capacitors, the firm claims.

▶**Precision Resistor**—Balco's precision resistor, developed under Signal Corps sponsorship, combines some of the advantages of existing deposited type and wire-wound precision resistors.

A comparison of existing types shows that the deposited film resistor has much lower inductance and costs much less than wire-wound units, but its resistance values are much more subject

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Photo courtesy Boeing Airplane Co.

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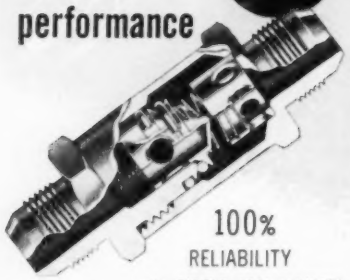

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to change with use or shelf life and it cannot be made to as close tolerances as wire-wound resistors.

The new Balco PR-1 is smaller and costs less than wire-wound units, yet has greater stability and can be made in closer tolerances than many deposited film types. Here are performance limits guaranteed for the PR-1:

• **Stability:** Less than 1% deviation from original resistance after 1,000 hours at full power dissipation. Less than 0.2% deviation after one year of storage.

• **Tolerance:** Standard units are available with tolerances of 1%, ½% and ¼%. Special units can be provided to 0.1% or better, company says.

• **Temperature coefficient:** 0.055% per deg. C. Units with a 0.036% coefficient will be available soon, company says.

• **Inductance:** No inductive component out to beyond 250 mc.; slightly capacitive component (0.6-0.8 μμfd) over this range.

• **Noise:** Less than ¼ microvolt/volt when tested to RETMA procedures.

The PR-1 comes in standard resistances of 10 to 100,000 ohms, may soon be available in one-megohm values. Power ratings are ½, 1, and 2 watts.

▶ **Resistor Construction**—The new resistor consists of a spiral of noble metal fused to the inner side of a hard glass tube by an undisclosed process. Various resistance values are obtained by changing metal spiral width, thickness, and length. Two metal end-caps are bonded to the glass body shield to form a hermetic seal capable of withstanding 60 psi., Balco says. Hermetic sealing is so effective, company adds, that units suffer a maximum resistance change of only 0.5% under MIL-R-10590A moisture test conditions, although the spec allows a 5.0% change.

Although an undisclosed type of trimming process is used to bring resistor values to the required tolerance, Balco says that 60% of the units come within 1% of the desired value prior to the trimming. The company designed all of the machinery used in the manufacture of its new capacitors and resistors.

▶ **Company Background**—Organized shortly after the war, Balco had only five employes in 1951 when the present management took over, according to Dr. M. K. Goldstein, company president. Today it has nearly 80 employes. Of these, 30 are professional scientists or engineers, nine are PhDs.

Goldstein came to Balco from the technical staff of the Air Navigation Development Board. Earlier he had headed the Aircraft Radio Navigation branch and the Aircraft Systems Engineering branch at the Naval Research Lab. Dr. L. R. Philpott, company's vice president and technical director, also came from the ANDB technical staff.

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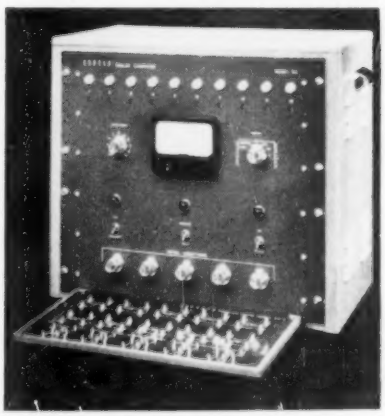

Electronic Sliderule

Low-cost table-model analog computer contains 10 amplifiers, regulated power supply, and provisions for applying five independent initial condition voltages. Manufactured by Donner Scientific Co., Model 30 uses plug-in circuit problem boards, enabling user to build a file of pre-wired equations. Technical bulletin 301 gives technical details. Price is $995. Company address is 2829 Seventh St., Berkeley 10, Calif.

activities today are divided almost 50/50 between component and electronic systems development. Recognizing the financial problem of trying to exist on government-sponsored research alone, Balco has tooled up to produce its new capacitors and resistors, as well as miniature noise filters and high-pass, low-pass, and band-pass antenna filters. Noise filters are available for 2000 operation.

Much of Balco's systems work is in the avionics field, under security wraps. One recently declassified project, for the Rome Air Development Center, is a huge radar-type antenna designed to beam UHF radio communications to and from aircraft. The three-story-high antenna, which can be located at some distance from a military airfield, is automatically aimed at an aircraft as soon as the pilot radios the airdrome. Signals for aiming the antenna are taken from a UHF ground-based direction finder.

The large antenna is positioned by means of a pulse-type signaling system, permitting transmission of signal intelligence over conventional telephone land lines. The system uses no electron tubes. Balco designed both the servo control system and the antenna.

► **Expansion Prospects**—Present company production capacity is about 15,000 resistors and 1,200 capacitors daily. However, company officials are planning expansion to handle anticipated demands. A separate manufacturing affiliate is one possibility, because Goldstein is wary of disrupting the existing research environment which has proved so creative to date.

The company's address: 49-53 Edison Place, Newark, N. J.

A Point Clarified

Solid Diffusion in Wire-Wrap Terminal

It appears that Philip Klass's article, "Experts Study Progress in Automation" (AVIATION WEEK Mar. 8, p. 42) has stimulated the interest of many readers. This is evidenced by the fact that several manufacturers of aviation electronics equipment have commented on the well-written review of R. F. Mallina's paper.

There is, however, a statement on page 43 in regard to "Wire-Wrap" connections which appears to have been confusing to a number of readers. The statement referred to is ". . . However, at elevated temperatures of 150° centigrade, Mallina reports 50% stress relaxation took place within 24 hours, which would appear to make the technique unsuited for avionic use."

Although the phenomenon of solid state diffusion is mentioned in the next paragraph, it is not made clear that the rate of diffusion is accelerated by the elevated

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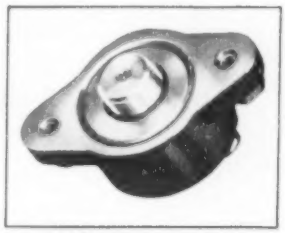
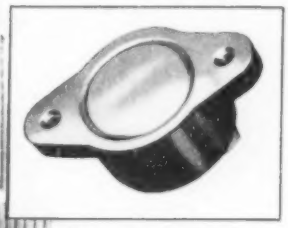
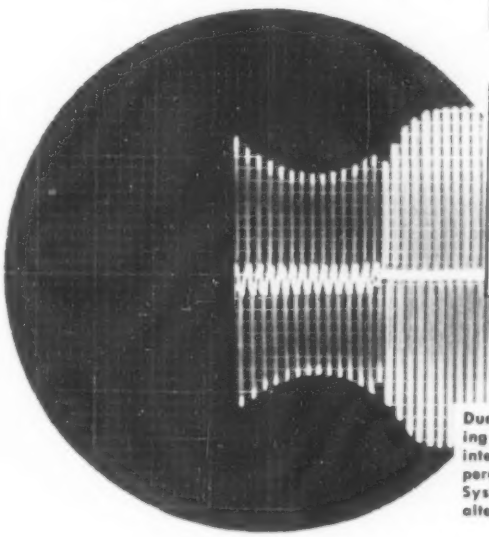


PDLM manual reset, Ratings: 35 to 150 amps.



PDLA automatic reset, Ratings: 35 to 150 amps.



Dual Beam Oscillograph recording of a PDLM — 70 amps., interrupting a fault of 3600 amperes, 400 CPS, 120 Volts A.C. System comprised of 4 — 40KVA alternators.

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temperature. (*The next sentence in* Aviation Week's *article reads: "Mallina says, however, that recent data indicates that solid-state diffusion between the wire and terminal takes place over a period of time when the terminal is constructed of suitable material. This effect, he indicated, counteracts the stress relaxation with age under high-temperature conditions."*—Ed.)

Actually a twin process takes place. While it is true that the stress relaxation is accelerated at increased temperatures, the solid state diffusion between wire and terminal is also accelerated; the net result being that the connection remains a stable and reliable connection even under extreme operating conditions.

For example, recent tests conducted in our laboratory under an ambient temperature of 250C show that the resistance of a solderless Wire-Wrap connection increases less than one milliohm after exposure of three weeks at this temperature. It is even questionable that the increase in resistance can be charged to the connection since it may very well have been caused by a change in grain structure of the material or a change in the diameter of the wire.

Due to this stability under extreme temperature conditions, as well as the other advantages pointed out in this article, it would appear that this technique is suitable for avionic use.

R. B. Shulters, Mgr.
Wire-Wrap Div.
Keller Tool Co.
Grand Haven, Mich.

New Microwave Components Reported

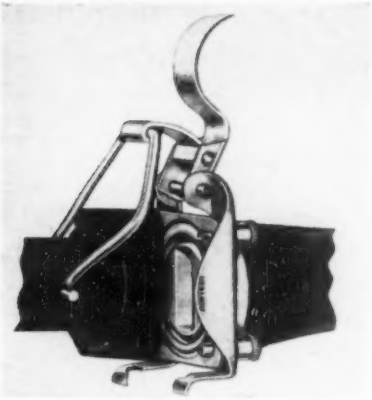
A new waveguide quick-disconnect coupling fixture, which can be easily attached or removed in cramped quarters without tools, is one of several recently announced microwave components and devices.

Developed by Airtron, Inc., the new quick disconnect, particularly useful in cramped airborne radar installations, is fabricated of stainless steel, except for mounting studs and bolts. Units are available to fit waveguide sizes of 0.360x0.220 in. to 2.0x1.0 in. and will maintain pressurized joints up to 30 psi. at −55C, according to manufacturer. Airtron, Inc., Dept. A, 1103 W. Elizabeth Ave., Linden, N. J.

Other new microwave components include:

• **Waveguide switch,** Model ASWI-X01, for 0.75x1.50-in. waveguide, has 0.5-sec. (maximum) switching time, maximum VSWR of 1.05:1, minimum crosstalk of 50 db., VSWR during switching of 1.2:1, power handling capability of 0.35 megawatts (CW), according to manufacturer. Actuator is a 110-v., 60-cycle motor. Thompson Products, Inc., Electronics Division, 2196 Clarkwood Road, Cleveland 3, Ohio.

• **X-band** reference cavities, small and



QUICK DISCONNECT for waveguide is easy to open (top) or close (bottom). Manufacturer is Airtron, Inc., Linden, N. J.

lightweight, have a frequency drift of only 0.4 mc. between temperatures of −40C to 100C, or 0.15 mc. under ambient pressures of 15 to 45 psia., according to General Electric. Company says that 10G vibration will cause frequency shift of only 0.1 mc. Units come in three models, with resonant frequency of 9,280 mc., 9,270 mc., or 9,350 mc. GE Tube Dept., Schenectady, N. Y.

• **Cross guide coupler,** Model X126E, provides higher minimum directivity over the band, less coupling variation with frequency change, and higher breakdown power according to Microwave Development Labs, Inc. Manufacturer says that coupler directivity is approximately 22 db. or more, mean coupling level is within 0.4 db. of 30 db., and coupling variation is less than 0.6 db. over frequency range. Company address: 220 Grove St., Waltham 54, Mass.

• **Waveguide-to-coaxial adapter,** Type 355A, for coupling between coaxial transmission lines and waveguides, has a maximum VSWR of less than 1.15 between 8.5 and 10.0 kmc., and less than 1.30 between 7.05 and 8.50 kmc., according to manufacturer. Input end of the waveguide section is fitted with an AN-UG 51/U cover flange. Manufacturer is Polytechnic Research & Development Co., 202 Tillary St., Brooklyn 1, N. Y.

• **Folded hybrid junction,** compact

Warner's Extension Power Brake Valve, shown above, has an exclusive hydraulic feed-back feature to give the pilot immediate warning in event of hydraulic system failure. This compact, lightweight, space-saving valve is adaptable to a wide range of system and brake pressures.

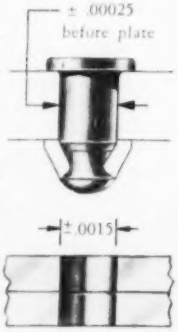
Warner is qualified by experience and facilities for the design and production of critical hydraulic equipment for a wide range of uses. Warner engineers will welcome an opportunity to assist you in the development of special hydraulic equipment to meet your particular requirements.

Write for your copy of the illustrated folder shown above describing typical examples of Warner precision hydraulic equipment.

Warner DIVISION OF DETROIT HARVESTER CO.
14300 TIREMAN AVENUE • DETROIT 28, MICHIGAN
DESIGNERS AND MANUFACTURERS OF PUMPS • VALVES • ACTUATORS

Reversing the usual procedure of inserting a semi-close tolerance fastener into a close tolerance hole–

HS51P-52P series HI-SHEAR rivet with a close tolerance shank, fits into a semi-close tolerance hole, pilot and core drilled.

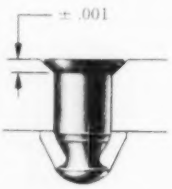


This easier made hole

reduces installation costs

Additional savings are realized in less drilling skill needed, equipment and inspection.

The head shaving operation, to achieve surface smoothness, is eliminated by installing this close tolerance head style HI-SHEAR into a properly prepared countersunk or dimpled hole.



160,000-180,000 psi heat treat–lead chamfer to aid interference fit–cadmium plated after grind to prevent corrosion.

Write for the HI-SHEAR Standards Manual

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THE hi-shear RIVET TOOL CO.
8924 BELLANCA AVENUE
LOS ANGELES, CALIF.

modified version of the familiar "tee" junction, is now available in sizes covering the frequency range of 2.8 to 35 kmc. According to manufacturer, the new folded hybrids have a bandwidth of 12% around design center frequency, terminated VSWRs under 1.3, and a minimum 30-db. isolation of the "E" and "H" plane arms. Manufacturer is Airtron, Inc., Dept. H., Linden, N. J.

New Power Supplies Put on Market

A new variable-frequency power supply capable of providing 13.5 kva. of three-phase power over a frequency range of 50 to 6,000 cycles is one of several laboratory-type power supplies recently announced. It may be used in

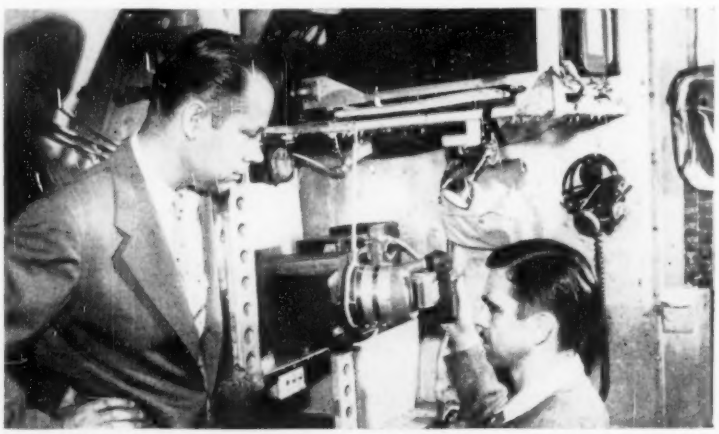
Aviation Week Picture Brief

PILOT gets storm and terrain warning from radar scope (arrow) mounted in Braniff DC-6. Panagra has similar installation. In both, scope is left of control column.

Radar Race Ends in Tie

Unofficial race between Panagra and Braniff Airways to be the first to put airborne radar into use on South American routes for evaluation of its usefulness in storm and terrain warning, ended in a tie, with both making their first flights on the same day, Apr. 16. The radar will also be used as a navigation aid where ground facilities are lacking.

Both carriers are using Navy-developed AN/APS-42 X-band (3.2 cm.) radar. This set is somewhat larger and heavier than weather radars being developed by Bendix Radio and RCA for airline use.



CAMERA record is made of picture on radar observer's dual scope installed in Braniff DC-6. Plane also is instrumented with a flight recorder to record turbulence.

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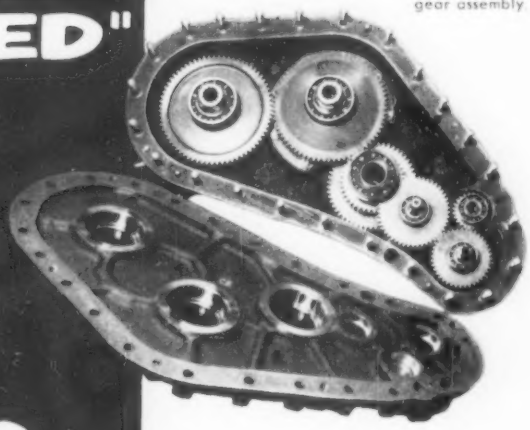
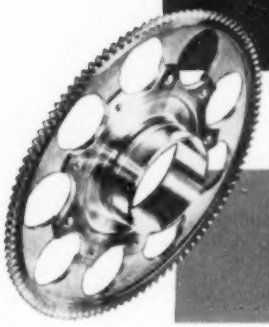
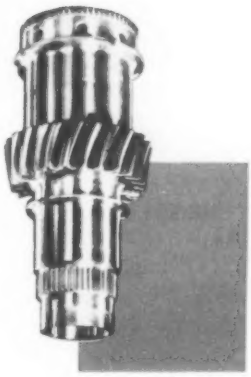
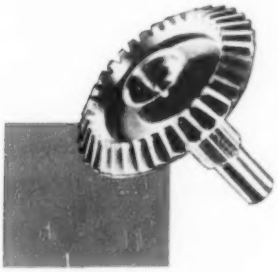
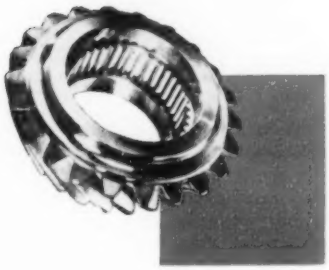


made with *precision*









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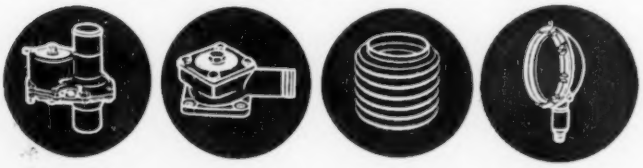


Crankcase Pressurizing Valve | Barometric Pressure Valves | Tech-Forge Flexible Couplings | Vaporproof Cabin Lamp

testing avionics equipment to power source requirements called out in MIL-E-5400.

The new Model 1447 three-phase supply, developed by Communication Measurements Laboratory, Inc., Plainfield, N. J., can be adjusted for any desired phase relationship between the three output phases.

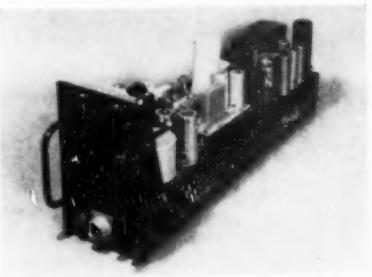
Other power supplies include:

• **Regulated variable d.c.,** covering range of 0-600 v., 0-1,000 ma., offers regulation of 0.05%, or better if required. A 0.3-v. vernier range is provided for transistor work and an injection circuit permits small signal modulation of the output. Electronic Measurements Co., Inc., Lewis St. & Maple Ave., Eatontown, N. J.

• **Low-voltage regulated d.c.,** Type 3-132, continuously adjustable between 0.15 v., can provide current up to 1 amp. Output drift is reportedly less than 5 mv./hour, ripple less than 1 mv. Manufacturer says a 10-v. change in line voltage causes less than 10 mv. change in output, with less than 20 mv. change from no load to full load. Consolidated Engineering Corp., 300 N. Sierra Madre Villa, Pasadena 8, Calif.

• **Wide-range regulated d.c.,** Model RE-2002, adjustable between 700-2,020 v., can supply up to 25 ma., has stability ratio of 10^6 and ripple less than 0.5 mv. Northeast Scientific Co., 1 Gray St., Cambridge 38, Mass.

• **Mag-amplifier regulator,** called Stablvolt Type A, is available in 6-, 12-, or 28-v. models, rated up to 100 amp. Regulation is reportedly better than 1% from no load to full load, better than 0.2% for input line variation of 95 to 135 v. Ripple is quoted at 0.5% rms. Manufacturer is Magnetic Research Corp., 318 Kansas St., El Segundo, Calif.



For Precise Frequency

Instantaneous frequency variation of 1 cps. and average deviation over 30-minute period of 0.1 cps. is claimed for new precision frequency regulator for inverters, which power new fire control and navigation systems requiring close frequency control. Model M-1087 weighs 28½ lb., can be used with single or three-phase inverters and is adaptable to a wide variety of different inverters, says maker, W. L. Maxson Corp., New York.

FILTER CENTER

▶ **Silicon Transistors Now**—Texas Instruments, Inc.'s Dr. G. K. Teal created quite a stir at the recent Dayton Conference on Airborne Electronics with his disclosure that the company can now supply production quantities of high-temperature, grown-junction n-p-n silicon transistors, in three different types. Type 900 is rated at 20 microamps at 100C, Type 901 at 40 microamps at 150C. Both have alpha cutoff frequencies of 2 mc., company says. Type X-15 has rated power output of 1 watt at 25C when operated push-pull. Alpha cutoff frequency is not given. Company's address: 6000 Lemmon Ave., Dallas, Tex.

▶ **Micro-Miniature Capacitor**—General Electric is developing a new tantalytic capacitor, for transistor circuits, reported to be half the kitchen-match-head size of its present micro-miniature line (AVIATION WEEK Apr. 26, p. 61). Production availability of the new line has not been disclosed.

▶ **Raydist for H-Bomb Tests**—Raydist, a continuous-wave phase-comparison system for accurately determining aircraft position, was used to pinpoint aircraft participating in the recent H-bomb tests in the Pacific, according to Hastings Instrument Co., which developed the system. Raydist recently was tied in with a helicopter autopilot and used to control its hovering position automatically. Air Force Armament Center, Eglin AFB, is also using Raydist to measure aircraft position on its precision bombing range. Similar equipment was used earlier to survey USAF's Long Range Missile Test Range.

▶ **Bell System Controls Regulus**—Remote radio control system used with Chance Vought Regulus missile, enabling it to land undamaged after flight tests, was developed by Bell Aircraft, the company reveals. The 60-lb. Bell system provides proportional (instead of earlier "beep-type") control, enabling human operator accurately to establish missile attitude, heading, and position of its controls. Positioning error is under 2%, response time is 0.1 sec.

▶ **New High-Temp Premium Tube**—Bendix Aviation's Redbank Division is now mass-producing a hard-glass premium version of the 6AQ5 beam power amplifier which can operate at bulb temperatures of 300C for a minimum of 1,000 hours, company says. New RTMA Type 6094 is similar to premium type 6005 except for high-temperature bulb made of Nonex glass. —PK

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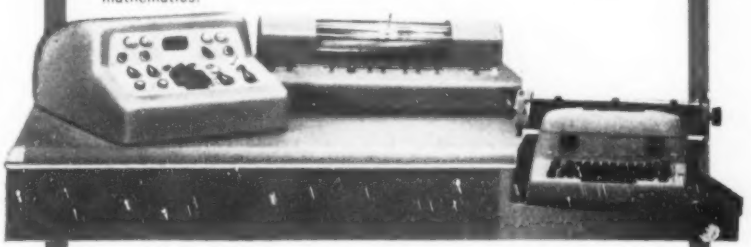

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For complete information please write for Brochure No. 2-2.

Bendix Computer

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OLD AND NEW fasteners made by Esna, left to right and top to bottom: ZA1W (new model at left); Blue J, LH and Y (new designs at right in each case).

Redesign Slashes Locknut Weight

Esna says use of new fasteners could save more than 100 lb. in one medium bomber now being produced.

A locknut is a small item. But because many thousands of these fasteners are used in a modern airplane, even a slight weight saving in their design is magnified tremendously.

Elastic Stop Nut Corp. of America has recently introduced four redesigned lines of fasteners that provide lightweight replacements for nearly every type and size of locknut used on aircraft and aircraft equipment. The slash in weight—which averages up to 65%—is made with no sacrifice in strength, Esna says. The new lines include hex nuts, anchor nuts, floating anchor nuts and gang channel nuts. They are designed for service at various temperatures, up to 1,200F.

According to Esna, one aircraft manufacturer has estimated that if he substituted the company's Blue J line for the steel nuts he now uses in his medium bomber he could save 115 lb. per plane. This does not include the additional thousands of locknuts used on subassemblies and components produced for this aircraft in other manufacturers' plants.

Aircraft designers say a weight cut of 100 lb. is equivalent to a gain of 1,000 lb. in fuel or the added performance a powerplant weighing 1,000 lb. more could give.

► **Four Series**—Esna's four new locknut series are:

• **Blue J.** Made of high-strength aluminum, these are authorized for use in place of steel locknuts of the same thread size. They meet the appropriate tensile strength specifications. The line also includes non-fixed nuts, anchor nuts, floating anchor nuts, and gang channel nuts. Sizes go up to ¼-28. Esna says that this line averages 65% lighter than comparable steel nuts, but costs slightly more. Blue J nuts get their name from the blue dye which is used to distinguish them from aluminum nuts now in use.

• **Type Y.** These are steel non-fixed nuts intended to replace hex nuts, primarily in the larger fractional sizes in which the Blue J line is not made. The Y series uses a double-hex design to reduce size of nut envelope with no loss in strength. These nuts weigh an average of 25% less than steel hex nuts of the same thread size and require less wrench clearance. Sizes: from 10-32 to ⅝-18. Price is somewhat higher than for steel hex nuts.

• **Type LH.** This new design is intended for anchor and channel applications at temperatures up to 550F. Other Esna high-temperature nuts use a slotted-beam threaded section for locking. Type LH has its cylindrical threaded area reduced in section at 90-deg. intervals. Esna says this gives a locking area which in effect "consists of four columns connected by elastic membranes." The top area is displaced in one plane, so that as the bolt enters, it conforms to the bolt. Esna says this design separates the load-carrying area from the locking area and is non-damaging to bolt or nut threads. This line averages 45% lighter than the Esna beam-type it replaces and it costs less than the other type.

• **Type ZA1W.** These all-metal, stainless steel, beam-type anchor nuts come for service up to either 800F or 1,200F. They are made in two pieces—the body is of the stainless steel required for the particular temperature range, and the base of another grade of stainless which is lighter and better suited for welding. The two pieces are spotwelded together in manufacture, so they may be handled as a single unit. On installation, the two pieces are fully locked together. They average 30% lighter than standard Esna stop nuts for the same types of applications, and cost less.

► **Nylon Insert**—Nylon is the new standard material for all Esna anchor nut inserts, replacing fiber.

In addition to its inertness to fuels, oils and most organic chemicals, nylon's wear-resistance and elastic recovery maintain the reusability of the locknuts at a high level.

What Locknut Redesign Means

Thread size	Type	Weight, Lb./100 New type	Weight, Lb./100 Type replaced	Weight, Lb./100 Saving	Cost increase per pound weight saved*
		Blue J Elastic Stop Nuts			
¼-28	hex	0.36	0.90	0.54	$0.68
8-32	anchor	0.20	0.85	0.65	0.58
		Type Y Elastic Stop Nuts			
½-20	hex		4.30	.....	.....
	double hex	3.20	.....	1.10	4.72
		Type LH Elastic Stop Nuts			
¼-28	anchor	0.70	1.20	0.50	costs less
6-32	anchor	0.27	0.45	0.18	costs less
		Type ZA1W Elastic Stop Nuts			
¼-28	800F anchor	0.84	1.20	0.36	costs less
8-32	1,200F anchor	0.93	0.51	0.42	costs less

* *Based on quantity discount prices.*

WHAT'S NEW

Telling the Market

Industrial explosion chambers made by Tenney Engineering, Inc., are described in four-page bulletin, available from the company, 26 Avenue B, Newark 5, N. J. . . . Selection and use of **metallic abrasives** are subject of Catalog 1153, put out by Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland 8, Ohio. . . . **Hydraulic servo valves** are described in Vickers, Inc.'s 20-page brochure, SE-15. Write: 1400 Oakman Blvd., Detroit 32, Mich. . . . Smith Bearing Co.'s **High-Capacity-Stud Cam Follower** is detailed six-page Folder 217. Company's address is P. O. Box 1119, Trenton, N. J.

How GE **d.c. dynamometer systems** can be used for motoring and absorption applications is told in 12-page publication, GEA-5923, available from General Electric Co., Schenectady 5, N. Y. . . . New brochure, VR-470, tells of company facilities and services for **solution of small-parts casting problems.** Write Vascoloy-Ramet Corp., Waukegan, Ill. . . . Four-page **Thread Repair Bulletin** No. 654 tells how Heli-Coil thread inserts can be used to fix worn or stripped threads. Heli-Coil Corp., 1467 Shelter Rock Lane, Danbury, Conn.

Opposed spindle drilling machines that are said to combine speed of a two-way drilling machine with flexibility of radial drill and accuracy of a horizontal boring machine are described in two-page catalog sheet put out by Walter P. Hill, Inc., 22183 Telegraph Rd., Detroit 19, Mich. . . . Chart of **26 standard styles of brake dies** is available to those who are interested in selecting equipment for bending or forming metal sheets. Write to Service Machine Co., Inc., 242 Miller St., Elizabeth, N. J.

New two-color folder illustrates 500 **jig and fixture components** manufactured by Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland, Ohio. . . . **Smooth hammered forgings, composite die sections and cast-to-shape tool steels** produced by Allegheny Ludlum Steel Corp.'s Forging and Casting Div. are covered in 28-page catalog available from Allegheny Ludlum's Advertising Dept., 2020 Oliver Bldg., Pittsburgh 22, Pa.

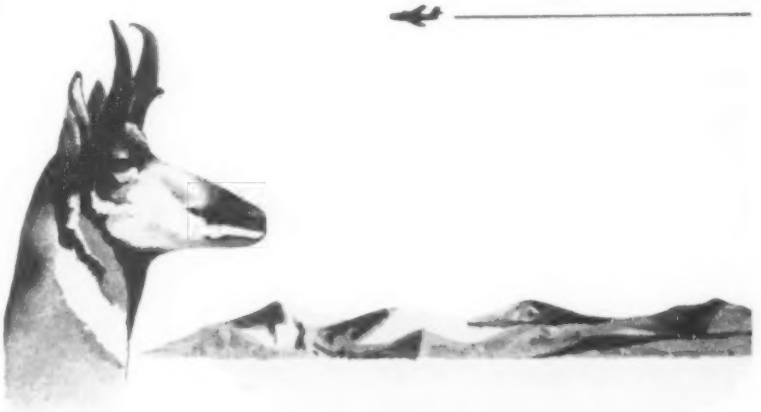
Use of **Unisorb mounting pads** and answers to questions on machine installation method are described in 8-page booklet put out by Felters Co., 210 South St., Boston 11, Mass. . . . 1954 catalog on **Calrod Electric heaters** and heating devices, containing 60 pages of data, with 175 photographs and illustrative drawings, is available from General Electric Co., Schenectady 5, N. Y.

New Publications

• **Ground Safety in Aviation Operations**—by John A. O'Donnell and John V. Grimaldi—pub. by American Museum of Safety and New York University's Center for Safety Education. Obtainable from Center for Safety Education, Div. of General Education, NYU, Washington Square, New York 3, N. Y. Single copies, $1.00; 10 or more copies, 90 cents each; 71 pp. Illustrated handbook for airline and airport personnel. This is said to be the first book of its kind.

• **Manual of Excellent Managements,** 1954 Edition—by American Institute of Management—pub. by American Institute of Management, 125 E. 38th St., New York 16, N. Y. 96 pp.; $20.00. Lists 348 companies in four basic lists, broken down alphabetically, by industry, geographically and by the American Institute of Management's rating within the companies themselves.

• **The Techniques of Supervision**—by Alfred R. Lateiner in collaboration with I. E. Levine—pub. by National Foremen's Institute, Inc., New London, Conn. 207 pp.; cloth bound edition $4.00, paper bound, $2.00. The attitudes and outlooks that modern supervision requires.



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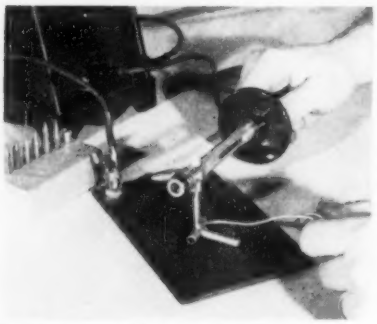
NEW AVIATION PRODUCTS



NEW SPOT solderer works fast.

Solderer Operates Only As Tool Touches Work

A changeable, carbon-tipped, electric spot solderer has been introduced by Newage International, Inc.

Known as the Newage Lorsol, the unit operates on low voltage supplied through an a.c. single-phase transformer. It's said to apply intense, concentrated heat the instant tool contacts work to be soldered. Heat continues at this high level during entire soldering operation, then shuts off when contact between tool and work is broken.

Solderer comes with an insulating handle, the end of which is formed to act as a shield against the heat. The transformer can be adjusted to six different heats. The tool can be fitted with two carbon tips at angles, in addition to the end fittings, and the tips can be machined to any shape to facilitate work in difficult and unusual soldering operations, the maker says.

Front collet is held in position, tightened by a nut. Interchangeable sleeves permit selection of size and shape of tip applicable to the job.

Carbons come in three diameters: ⅛, ¼ and ⅜.

Newage International, Inc., 235 E. 42nd St., New York 17, N. Y.

New Rotary Actuators Are Small, But Powerful

A line of new miniature, high-torque rotary actuators is said by its manufacturer to include the smallest, lightest packages for their specific output capacities. Made by Globe Industries, the units consist basically of the Globe permanent magnet Moto-Mite and planetary gear reduction.

The manufacturer reports special units can be developed for particular applications, including low backlash, water-proofing, limit switches, dynamic braking, slip clutches, follow-up potentiometers and speed governors.

Maximum dimensions are 2x5⅛ in. and capacities go up to 2,000-in. oz. torque depending on output speed. Voltage ranges from 6 to 100 v. The actuators can be arranged for different speeds, torques, angular rotation and include reversing relays if desired.

Globe Industries, Inc., 1784 Stanley Ave., Dayton 4, Ohio.

Aircraft Polisher Gives Hand-Rubbed Effect

Cyclo Mfg. Co.'s new polisher and sander for cleaning and polishing aircraft wings and fuselage incorporates translatory (back and forth) rather than rotary motion.

The manufacturer reports that the translatory action of the dual-head unit gives the same motion as hand polishing, eliminating the high peripheral motion that is a characteristic of rotary heads. This prevents swirl marks or burning. The machine will remain steady on a flat surface when in operation, the company notes.

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Cyclo Mfg. Co., 2140 So. Delaware, Denver, Colo.

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New Seat Units Could Save 300 Lb. per DC-6, -7

Hardman Tool & Engineering Co. has developed a new lightweight chair that is said to be completely interchangeable with all Douglas DC-6 and DC-7 dayplane equipment.

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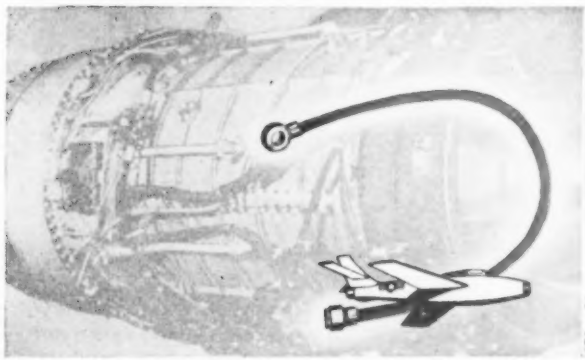
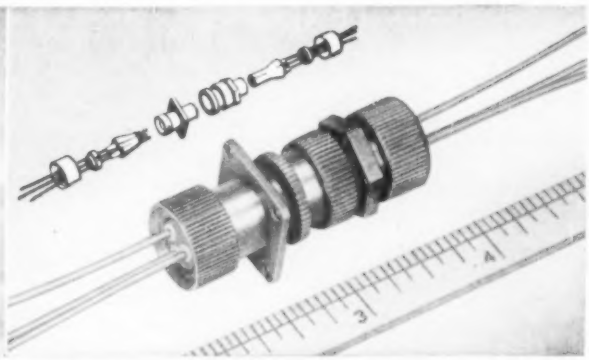


DEPENDABLE FUEL FEEDING. Fuel for the J65 Turbojet Engine is injected to the burners through Titeflex® flexible metal hose. Tough, lightweight Titeflex—tested for temperatures from —70°F. to +600°F. and for pressures up to 500 psi—reliably conveys fuel to engine nozzles; withstands vibration and rough use; is excellent for complex configurations.



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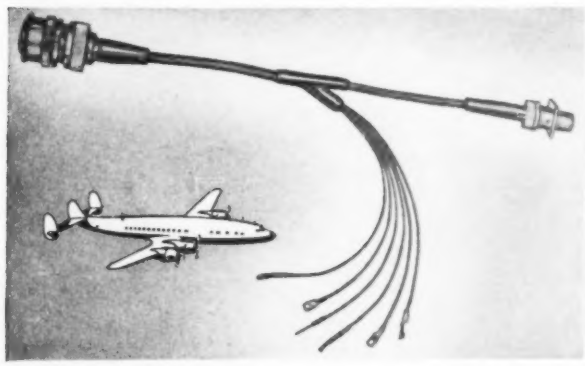

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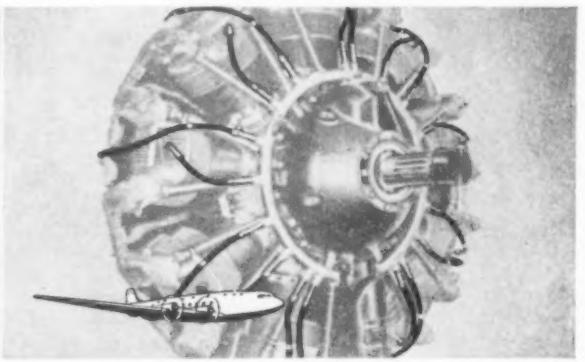

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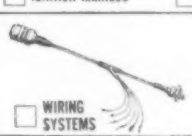

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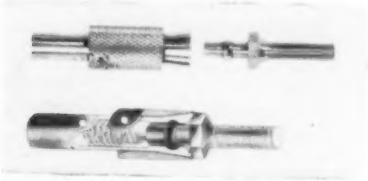
ing seat bottoms, custom upholstery covers and molded Boltaron side panelling. High underseat clearance in the rear is said to provide good legroom.

Double units are tested to 9G and weigh from 59 to 62 lb. each. Manufacturer says utilization of this seat would save up to 300 lb. per aircraft in DC-6s and DC-7s.

Hardman Tool & Engineering Co., Los Angeles, Calif.



CONNECTOR reduces cable endplay.

One Hand Can Operate Quick-Disconnect Unit

One hand is all that is needed to operate a new quick-disconnect unit put on the market by Hydraulic Products Co. The H. P. Quick Disconnect has withstood extensive vibration tests, meets all National Aircraft Standards Committee specifications.

Designed to eliminate endplay and looseness in aircraft rod or cable controls, the unit has been tested successfully with tension and compression loads of about 2,000 lb. It incorporates a chuck-like locking unit with sliding collet.

The device is supplied from stock for all standard thread sizes, and is said to be readily adaptable for any specially designed attachments.

Hydraulic Products Co., 80 Federal St., Boston, Mass.

Precise Dividing Head Is Fully Adjustable

For engraving, drilling, light milling, profiling and layout work on dials, cams, templates, round dies, cylindrical parts or anything requiring precise angular settings and rotary divisions, a new fully adjustable dividing head has been developed by H. P. Preis Engraving Machine Co.

Designated the Preis-Panto Dividing Head DH-4, the device features adjustment from horizontal to vertical position, rotates a full 360 deg. with precision graduation, has fine adjustment in minutes for rotary micro setting and incorporates a three-jaw, three-step chuck.

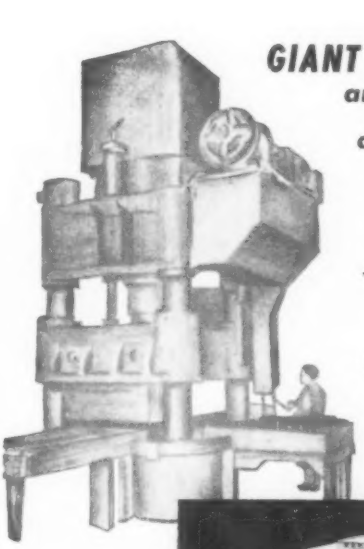
Overall dimensions are 7½ x 7½ x 4 in. Height of the chuck in horizontal position is 3¼ in., external chucking capacity is 4⅛ in. and internal up to 4½ in. Net weight is 15 lb.

H. P. Preis Engraving Machine Co., 31 Industrial Branch, Hillside, N. J.

ALSO ON THE MARKET

Insulated thermocouple extension wire, type PN, has polyvinyl-insulated conductors and nylon insulation overall. Previous types used cotton as insulation. Nylon permits smaller diameter, smoother surface, increased resistance, easier stripping and lower cost. It is made for iron constantan, copper constantan and chromel alumel wires in 14, 16 and 20 gage.—Thermo Electric Co., Inc., Saddle River Township, Rochelle Park Post Office, N. J.

Magnetic separator for hydraulic fluid systems is lightweight and permanent. It removes fine steel particles that may wear off moving parts. Unit was designed specifically for use in aircraft hydraulic circuits but reportedly may be installed wherever working pressures do not exceed 3,000 psi. Fluid enters from either end and is filtered through a stack of soft steel grids which are strongly magnetized. Separator measures 5⅜ in. in length, 2⅛ in. in diameter. It is made for ¼-in. tube connection, and has a maximum capacity of 10 gpm.—S. G. Frantz Co., Inc., Trenton, N. J.



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WHO'S WHERE

(*Continued from page 11*)

W. W. Beadle has been promoted to production superintendent at Chrysler Corp.'s jet engine plant near Utica, Mich. **E. J. Weiss** is new plant engineer.

Joseph B. Tuzen has joined the application engineering staff of Marquardt Aircraft Co., will specialize in ramjet powerplants. **Harold A. Fisher** has been appointed acting industrial relations manager.

Scott H. Hanville, Jr., is new technical sales manager for Jack & Heintz, Inc., Cleveland, will be responsible for predicting aircraft needs and probable obsolescence of equipment.

William M. Beveridge, former manager of Teterboro (N. J.) Airport, has been promoted to assistant manager of New York's Idlewild International Airport.

Joe K. Hicks has assumed duties as manager of Reno (Nev.) Municipal Airport.

John F. Romans has been named general manager of Eaton Manufacturing Co.'s new Aircraft Division, Battle Creek, Mich., which will concentrate on jet engine blade production. Manufacture of other aircraft and automotive parts now being made by the firm's Valve Division will continue in the present setup near the new division.

Elliott H. Ruttenberg has been designated price administrator for National Co., Inc., Malden, Mass., electronics firm.

F. M. Files has been transferred to Phillips Petroleum Co.'s rocket fuels division which is part of Phillips' research and development department.

Dwight W. Kaufmann has been appointed eastern sales manager of Rem-Cru Titanium, Inc., with offices at Midland, Pa. **George T. Fraser** has been designated western sales manager with offices in Los Angeles.

Fred C. Stebbins has been named civil aviation sales manager for Scott Aviation Corp., Lancaster, N. Y.

Adolph Kastelowitz has been promoted to chief manufacturing engineer of Republic Aviation Corp., Farmingdale, N. Y. **Nils H. Lou** has been named factory manager of the company.

James L. Fechter has been appointed manager of the Ground Support and Electronics Division and chief engineer for Southern California Aircraft Corp.

B. A. Barker has been named assistant purchasing agent in charge of general purchases and **L. C. Held** has been made assistant purchasing agent in charge of subcontracting, Chance Vought Aircraft, Inc., Dallas, Tex.

James H. Cobb has been named director of advertising for American Airlines, succeeding **James Dearborn**, appointed director of sales programming.

Alvin D. Niemeyer has been appointed operations manager of North Central Airlines, succeeding **Robert Ceronsky**, who returns to piloting duties.

Gustav Crawford has retired as chief of New York's Police Aviation Bureau to join Mohawk Airlines as captain and instructor of helicopter passenger service at Newark (N. J.) Airport.

Horace R. Cardoni has been promoted to contracts manager of the Instrument Division of Daystrom, Inc., Archbald, Pa.

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BACKED *by the finest service facilities in the industry.*

BACKED *by Scintilla Division field service specialists.*

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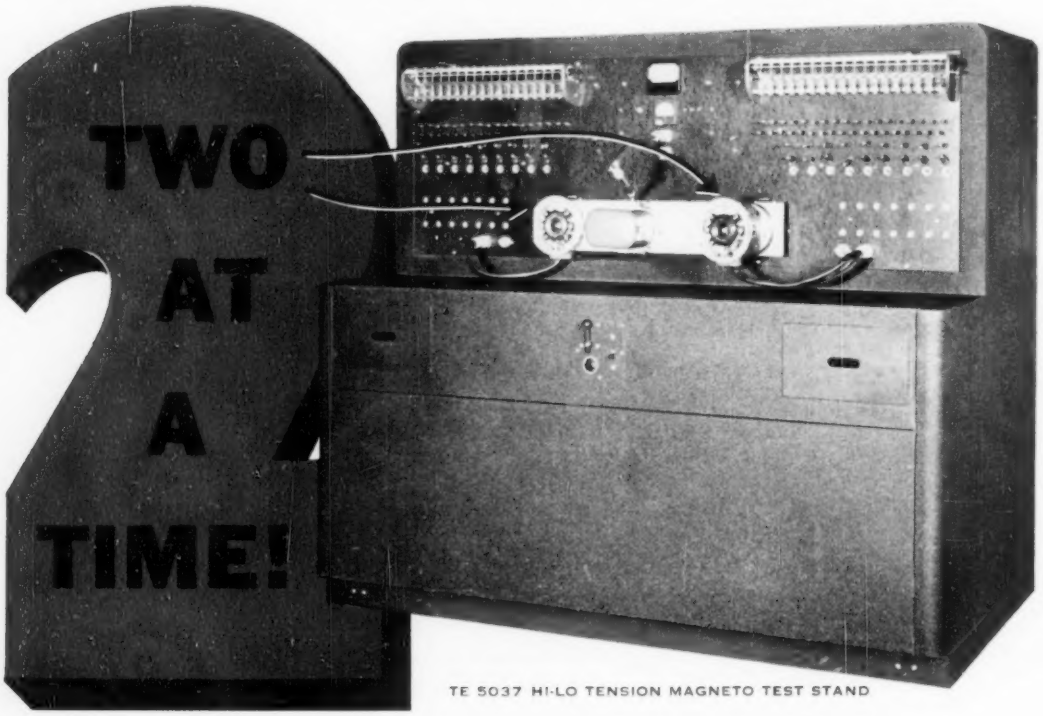

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CONVAIR YC-131C is the first U. S. turboprop transport to challenge the increasing international popularity of Britain's . . .

VICKERS VISCOUNT four-engine turboprop, of which approximately 100 have been ordered by BEA and a number of other airlines.

Turboprop Transport Battle Heightens

- **Convair counters reported Capital Airlines deal for Vickers Viscounts with first flight of C-131C.**
- **Company study claims that piston-powered CV-340 can be operated more profitably than British contender.**

By Richard Balentine

International competition for the medium transport aircraft market moved toward a climax last week with these developments:

- Capital Airlines is on the verge of purchasing Vickers-Armstrongs turboprop Viscount 700s to bolster its fleet.
- Convair backed its bid for turboprop transport business with the first flight of the C-131C at Ft. Worth, Tex.
- Convair also challenged the Viscount's operating costs with the airline performance of the 340.

Capital officials in Washington would not confirm or deny reports of an impending deal with the British manufacturer until J. H. Carmichael, the airline's president, returned from England.

An industry source just returned from Britain told AVIATION WEEK that Vickers offered Capital four Viscounts on a one-year trial basis. If the airline approved of the Viscount, it could buy and sign a contract for 46 more, it is reported.

Vickers also reportedly has offered to establish a spare parts depot in this country, and Capital would pay only for parts requisitioned from the depot, thus avoiding the expense of maintaining a sizable spares inventory.

The Viscount's four turboprops presumably would be overhauled at Rolls-Royce of Canada, Ltd., at Montreal, where Rolls builds the Nene engine and operates an overhaul depot.

▶ **Tough Competition**—U. S. manufacturers consider such an offer extremely tough competition. Some observers believe Capital will find it difficult to turn down such an attractive contract. However, the airline said last week its officials were looking over all British transport aircraft.

Only problem before Capital could fly Viscounts in the U. S. is Civil Aeronautics Administration certification. In England, industry observers report the CAA certification group, headed by W. H. Weeks, chief of CAA's Aircraft

CONVAIR YC-131C has large, square-tipped props. Convair officials (photo, right) get first flight details from test pilot B. A. Erickson (left). Listening are August C. Esenwein (right), Convair vice president and general manager of the Ft. Worth Division where the 340 was modified to take 3,750-hp. Allison turboprops, and Paul Lynch, project engineer. YC-131C first flew May 20.

Engineering Division, appears likely to certificate the Viscount.

Convair's C-131C is powered by two Allison T56 turboprops that develop 3,750 hp. each, compared to the 2,400 hp. of the Pratt & Whitney Aircraft R2800-CB16 reciprocating engines of the CV-340.

► **340 Conversion**—Convair announced last summer that T56 conversion kits (AVIATION WEEK Aug. 10, p. 14) would be available for airline operators by the first quarter of 1956. The kits will enable airlines operating 340s to make their own conversion to turboprop power.

Cost of the conversion operation is expected to be $350,000 per aircraft. Kits will include powerplants, new nacelles and engine instrument and control systems. Convair's 340s have been stressed to take turboprop power so that no structural modifications will be required for conversion.

Addition of turboprops to the CV-340 will increase the speed from 275 to 335 mph. Top speed of the C-131C is 380 mph., with a maximum cruising altitude of 30,000 ft.

Allison expects to get CAA commercial certification for the T56 in the fall of 1955.

The Rolls-Royce Dart R.Da.3 turboprop now in service is rated at 1,400 hp. plus 375 lb. static thrust (AVIATION WEEK Dec. 14, 1953, p. 17). Those coming into service have been boosted to 1,550 hp.

► **Turboprop Experience**—Gen. Joseph T. McNarney, Convair president, recently said: "Convair probably has more varied turboprop experience than any aircraft manufacturer in the industry, and we are fully aware of the future possibilities of turboprop commercial transports.

"At the moment, however, our own cost studies and figures presented to the Civil Aeronautics Board by such operating airlines as Braniff and Continental definitely show the piston-powered Convair-Liner to be less expensive to operate than the turboprop Viscount."

More than 360 Convair-Liners now are in use by 33 airlines throughout the world. The Viscount has been flying commercially since British European Airways inaugurated the turboprop transport on its London-Cyprus route Apr. 18, 1953 (AVIATION WEEK May 11, 1953, p. 28). BEA now is operating 20 Viscounts.

► **Comparison**—With that experience, here is the way both planes compare, according to a Convair study:

• Price of the Viscount, including radio equipment, is $745,000. A Convair 340 costs $685,000.

• In the first year of operation, each of the Viscount's Dart turboprops required overhaul at least 2.86 times. The P&WA R2800s on the Convair require overhaul 1.82 times per year. Convair claims the R2800 costs about one-quarter as much to maintain as the Viscount's turbprops.

• On a year-round basis, Convair figures it can carry four more (44 total) revenue passengers 14 mph. faster the same distance at 10,700 lb. less weight. Maximum gross weight at takeoff of the Viscount is 60,000 lb., the Convair is 47,000 lb.

• Under year-round conditions, the Viscount can fly a 500-mi. trip with a 12,068-lb. payload at an average block speed of 229 mph. Such a trip would cost a Viscount operator $934. To break even, the turboprop would have to carry 37 passengers and 75% cargo load factor.

A Convair, under the same conditions, would fly the trip with 11,066-lb. payload at 243 mph., which would cost $650. In order to break even, the Convair would have to carry only 25 passengers, according to Convair's figures.

• In hot weather, the Viscount requires 4,400 lb. more fuel to cover the same 1,000-mi. trip than does the 340. Convair figures the speed on a hot day would be 339 mph. for the Viscount, 259 mph. for the 340.

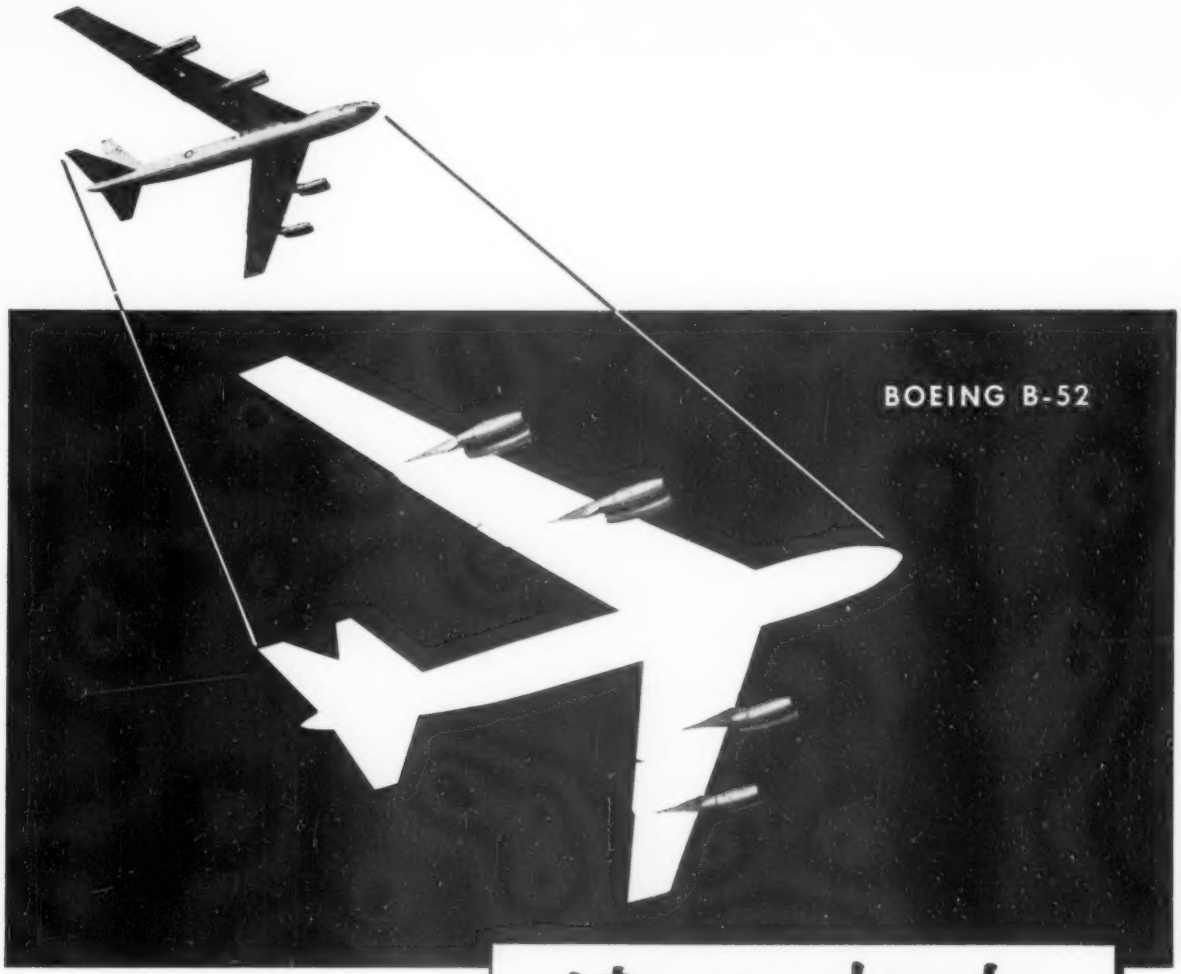
• Viscount's Dart engines burn turbojet fuel that is seven cents cheaper per gallon than the 100-octane fuel needed by the Convair-Liner, J. G. Zevely, Convair's director of contracts, says but the Viscount burns almost twice as much as the 340 on either 300- or 600-mi. trips, he adds.

• Oil costs show almost a six-to-one advantage for the Convair, says Zevely. The synthetic oil needed by the Viscount costs $13 per gallon. The natural oil for the Convair costs 75 cents per gallon and it need not be changed until the engine is overhauled after 1,200 hr. of operation. The Viscount oil must be changed every 200 hr.

• Direct operating costs on a 300-mi. run by a first-class Convair are 1.73 cents per seat per mile. On the first-class, 40-passenger Vickers, the cost is 2.80 cents per seat per mile, Zevely says. On a 600-mi. trip, the costs are 1.54 cents for the 340 and 2.50 cents for the Viscount, he points out.

• Aircoach version of both planes carries 48 passengers. On a 300-mi. tourist hop, the Convair costs 1.58 cents per seat per mile. The Viscount costs 2.34 cents per seat per mile. For a 600-mi. trip, costs would be 1.41 cents for the 340 and 2.09 cents for the Viscount, according to Convair.

• The British turboprop can cruise at 25,000 ft. This is no particular advantage, Zevely says, because it is an unusable feature. In the 300-mi. range, where most trips are made, the optimum altitude for both planes is approximately 15,000 ft., he says. For a 1,000-mi. trip the optimum altitude



This is the giant new Boeing B-52 — and this picture explains exactly what Rohr is famous for: Building power packages — like the jet pods for this new Stratofortress — and other equally famous commercial and military planes. In addition, Rohr aircraftsmen are currently producing more than 25,000 different parts for all types of airplanes.

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is no more than 20,000 ft., Zevely reports.

▶**Strong Competition**—Upon completion of a recent worldwide inspection tour, Frank C. Stone, administrator of CAA's International Region, said: "While we find expressions in most countries favoring U. S. experience and knowhow, we see strong competition for our short- or medium-range transport planes in the world market.

"The English particularly are pushing their aircraft sales vigorously, and they have an advantage over us in the financial arrangements they are able to make."

Stone referred to easier credit agreements the British government permits compared to U.S. credit standards. The agreement with Capital, aside from the one-year trial stipulation, was not known last week. State Department vigorously is seeking the contract terms.

▶**American View**—"It seems inevitable that within the near future we on the North American continent and even here in the U.S. will be faced with direct competition . . . from some four-engine aircraft of reputedly smooth operating characteristics with high passenger appeal," William Littlewood, American Airlines vice president-research, said at San Diego recently.

"The airplane in question, is apparently excellent in many respects but does not appear to be as satisfactory as might be built with the availability of slightly larger powerplants and the modification of some design characteristics."

Littlewood's observations of the medium transport field seem significant in view of Capital's recent maneuvers.

Subsidy Reduction Gains Favor

By Katherine Johnsen

The Administration's program to reduce airline subsidy gradually may be accelerated by Congress' refusal to appropriate the total funds requested by Civil Aeronautics Board.

This was indicated strongly at the final hearing of the Senate Appropriations Commerce Subcommittee on the $73 million for fiscal 1955 subsidy payments to the airlines.

▶**Payment Plan**—Pointing out that the House cut the amount to $40 million, Sen. Styles Bridges, chairman of the subcommittee and of the full Appropriations Committee, asked CAB Chairman Chan Gurney: "Assuming . . . that the appropriation allowed by the House, or a lower appropriation, were allowed, how would you apportion the payments of subsidies? How would you prorate it?"

Gurney replied: "We would pay each carrier every month as long as the money lasted. . . . We would pay each carrier as their bills came in on an equal basis. We would not restrict it to one class or the other, under the law."

Other highlights of the hearing:

• Bridges suggested that the subsidy bill might be reduced by eliminating duplicating international routes.

• Sen. Harley Kilgore questioned CAB's policy of allowing income taxes as an airline operating cost, instead of leaving the taxes to be paid out of profits, and suggested that salaries to top airline officials, included as operational costs, should be controlled. Presumably, the control would be a CAB responsibility.

▶**Parallel Routes**—Observing that the report of the Air Coordinating Committee proposed the reduction of subsidy through the elimination of duplicating airline services, Bridges asked: "Was the certification of Braniff Airways in South America a complete reverse of that policy? How much of the subsidy requirements of the services outside the U.S. are due to the institution of duplication or paralleling services? That is an important question."

Gurney said: "The judgment on the extra subsidy needed because of those unneeded paralleling lines caused many of the recommendations to be made to the President. You spoke of the one that seems to be the largest at the moment, possibly not the largest, but the third line into South America is quite a drain and makes quite an addition to our subsidy request.

"There are four lines to Alaska. That is too many. There are two lines from Seattle to Portland and Honolulu. It is questionable as to whether the traffic would warrant one line.

"There are other places that are duplicative, but those are the outstanding ones."

▶**Temporary Permits**—Gurney concurred with Kilgore that it would be advisable to eliminate permanent route certificates and, instead, to grant "10-, 12- or 15-year permits to encourage competition and so that the government would not have the burden of proving malfeasance by the certificate holder" to eliminate a route.

"The Board would be in much better shape," Gurney declared, "if we could, at intervals, look at these routes that are presently operating under permanent certificates."

Kilgore proposed that the temporary certificate, leaving open the possibility of revocation for inadequate services, "would serve just as well as a duplicative competing line."

Gurney: "That is true. But good judgment must be used on that because

Inside the Boeing 707's Cockpit

First photo showing the interior of the new four-jet Boeing 707 Stratoliner-Stratotanker transport details the cockpit layout and flight engineer's panel (right). Inspecting the panel are Boeing's chief test pilot, A. M. (Tex) Johnston (left), and co-pilot Richards (Dix) L. Loesch, who will handle flying duties when the big plane starts its flight tests. The flight engineer's panel can be swung forward so that the co-pilot can take over these duties when there is a two-man crew, as planned on the first flight.

the carriers have to do a lot of planning for the future and financing, and they might find it difficult if we were too strict on that kind of proposition."

Other points developed by Kilgore:

- CAB has allowed overestimated tax payments by airlines as costs, instead of the actual taxes paid. He asked the Board for a compilation showing the tax allowances of CAB, compared with the actual taxes paid by airlines since 1946.

Irving Roth, chief of CAB's Rate Division, said that since 1950, the Board has allowed as cost only the actual taxes paid by airlines, as shown in returns to the Bureau of Internal Revenue.

Although under the policy prior to 1950 of using airline estimates of taxes "there may have been some cases that involved a potential windfall," Roth said that most of the money was recaptured.

- There is now no way of recapturing overpayments to airlines because of overallowances for taxes. "If it is paid as a consequence of a closed, final rate," CAB counsel E. T. Nunneley declared, "I do not believe it can be recaptured in any way under existing legislation."
- In 1953, the 10 top executives of Pan American World Airways received $376,800 in salaries, and persons outside the company being paid more than $10,000 received $465,354, or a total of $842,154.
- In 1953, the 10 top executives of Trans World Airlines received $465,082, and persons outside the firm being paid more than $10,000 received $564,320, or a total of $1,029,402.

Kilgore requested a statement showing the salaries and expense accounts of the 10 top executives of all airlines receiving subsidies and the payments by these carriers to outside persons and firms.

Germans May Seek Lufthansa Operator

West Germans may contract with a foreign carrier to operate an airline for them if they are unsuccessful in obtaining operational rights within the next year.

This proposal was made by Hans Christoph Seebohm, West Germany's transport minister, at the 30th anniversary of Templehof Airport in Berlin. Seebohm predicted the Germans would have four aircraft operating within a year.

▶ **French Delay**—The West German minister said it is "incomprehensible" that German civil aviation still is outlawed by the allies.

The holdup is the result of France's delay (AVIATION WEEK May 17, p. 16) in signing the contractual agreement drawn up at Bonn two years ago. Britain and the U.S. already have signed the agreement.

▶ **PAA Chances?**—Observers abroad claim Pan American World Airways has a good chance of being considered by the West Germans as a possible contracting company to assure the Germans of their own airline operation. This presumably would be similar to Trans World Airlines' arrangement with the Ethiopian government in operating Ethiopian Airlines.

When organized after World War II, the German airline was known as Luftag, but Seebohm says the name is being changed to Lufthansa, the company's prewar name.

Although without equipment, the airline is going ahead with training of pilots both in West Germany and in Britain.

Fight for Routes

- **PAA, TAL urge cuts in NWA Pacific service.**
- **Northwest calls PanAm objective 'monopolistic.'**

Three new briefs have been filed with Civil Aeronautics Board in the controversial trans-Pacific route case involving Pan American World Airways, Northwest Orient Airlines, Trans World Airlines and Transocean Air Lines.

- Pan American asked that CAB remove the "artificial restriction" that forces it to detour more than 1,000 mi. through mid-Pacific islands on its flights to the Orient.
- Northwest contended that examiner Thomas L. Wrenn's recommendations (AVIATION WEEK Mar. 29, p. 63) that NWA route to Hawaii be discontinued and its certificate for the north Pacific route be renewed for five years instead of permanently, giving Pan American both routes, would serve to "further PAA's monopolistic objectives."
- Transocean renewed its fight for international charter and irregular carrier's application for certification to operate non-subsidy passenger and cargo service from California to Hawaii, Guam, Japan, Hong Kong and other points in the Far East.

▶ **Tax Waste?**—In its brief, Pan American cited waste of millions of dollars of taxpayers' money and inconvenience to passengers, shippers and users of the mail services as compelling reasons for permitting it to operate its flights by the shortest Great Circle route.

PAA held that the restriction, first imposed in 1946, was "for the sole purpose of cushioning Northwest against the effects of competition." The airline quoted from Examiner Wrenn's report, which stated: "There appears to be no logical reason for tying Pan American's hands behind its back with respect to California traffic in order to favor Northwest in that market."

The question also was raised by PAA as to whether, "in the interest of lessening subsidy burdens," NWA's trans-Pacific certificate should be renewed.

▶ **Killing Blow**—Northwest countered with the argument that "the national policy of fostering competition was set forth in the Civil Aeronautics Act and has consistently been followed by CAB." Approval of the examiner's recommendations, the airline contended, would destroy such principle.

Granting of Pan American's request to fly the north Pacific route, said NWA, would result in a 30% to 40% cut in Northwest traffic to the Orient. The airline claims to receive that

Scheduled Airline Traffic

U. S. domestic certificated airlines schedule approximately 2,174 flights daily, Air Transport Assn. reports. Here are the passengers and passenger-miles flown during the first four months of 1954:

Passengers

	Trunks	Local service	Territorial	International	Total
Jan.	2,023,001	140,738	52,644	191,676	2,408,059
Feb.	2,016,224	151,316	49,076	175,168	2,391,784
Mar.	2,088,649	169,003	54,886	231,704	2,544,242
Apr.	2,438,937	193,365	55,792	235,411	2,923,505
Total	**26,733,255**	**2,119,853**	**680,866**	**2,588,572**	**32,122,546**

Passenger-Miles

(000 omitted)

Jan.	1,175,796	26,919	6,370	240,830	1,449,915
Feb.	1,107,393	28,484	5,831	228,751	1,370,459
Mar.	1,200,051	31,989	6,129	282,595	1,520,764
Apr.	1,327,108	36,228	6,099	282,906	1,652,341
Total	**14,704,987**	**403,992**	**81,866**	**3,433,456**	**18,624,301**

amount of traffic from the oriental communities in California.

Such a loss, the brief held, would be the first step in forcing Northwest out of the international air carrier picture.

NWA also argued for approval of the proposed link with TWA routes at Hong Kong, holding that such a link would supply a second and competing round-the-world route in competition with Pan American.

▶ **Able Competition**—Transocean, in arguing its case, pointed to the fact that Examiner Wrenn found it "fit willing and able to perform service in the Pacific and that its irregular services had met a public need."

The carrier held that Northwest "has failed and will continue to fail" to provide the effective competition for Pan American that CAB sought in the experimental pattern, despite NWA's "large subsidies and advantageous route structure."

"Transocean can provide sufficient competitive incentive to Pan American in the Pacific area without benefit of subsidy, providing that its operating authority is sufficiently flexible and includes service between California and Hawaii," the brief stated.

The carrier took the position that if the Board fails to approve its application for scheduled services, it should adopt the examiner's recommendation that it be certificated for irregular service.

NWA Plans to Name New President Soon

Northwest Orient Airlines was still without a president last week following one of the shortest (25 min.) stockholders' meetings in its history.

Malcolm S. Mackay, executive vice president, who has been acting as president since the resignation of Harold R. Harris Mar. 4, said all officers and directors were re-elected at the St. Paul, Minn., meeting. A. E. Floan, vice president and secretary, was appointed a director.

▶ **Fight Averted**—Mackay indicated that the matter of selecting a president has now "nearly jelled" and an appointment is expected within three weeks' time.

A group of stockholders calling themselves a "stockholders defense committee," headed by NWA pilots Joseph A. McKeown and Peter J. Cleary, threatened a proxy fight prior to the stockholders' meeting. They wanted to replace eight of the directors with prominent executives from all parts of the country.

The short-lived committee's proxy was submitted to Securities & Exchange Commission but withdrawn before it was made public. Dispute of the stockholders' committee with management of the airline was settled by board chairman Croil Hunter, McKeown and Cleary through a Minneapolis member of the Moral Rearmament movement.

External Tanks Boost DC-7 Range

First view of new Douglas DC-7B nonstop trans-Atlantic transport shows external saddle-type fuel tanks located atop the wing and forming part of enlarged engine nacelles. The novel tanks increase normal DC-7 tankage from 5,512 to 6,400 gal. An additional 90 gal. may be carried in optional center wing trailing edge tanks. The new DC-7B also has a new flap linkage system permitting optimum flap positioning for takeoff. Takeoff gross of the DC-7B is 125,000 lb., compared with DC-7's 122,200 lb. The plane is powered by Wright R3350-DA4 Turbo Compound delivering 100 more METO (maximum except takeoff) hp. than earlier DA2. CAA certification tests of the DC-7B are expected to get under way sometime in September.

CAB ORDERS

(May 7-13)

ORDERED:

Ozark Air Lines, Inc. to show cause why the Board should not fix its mail rates.

Central Airlines, Inc. to show cause why the Board shoud not fix its mail rates.

Severance of National Airlines application from the additional Southwest-Northeast service case.

Amendment of Northeast Airlines certificate so as to suspend service for a period of five years at Provincetown, Mass.

DENIED:

Western Air Lines application for authority to suspend service at Spearfish, S. D.

American Airlines and joint petition of the Commonwealth of Kentucky, City of Louisville, Ky., and Jefferson County air board and the Louisville chamber of commerce for consolidation with the additional Southwest-Northeast service case.

Motion of city and chamber of commerce of Charlotte, N. C. to have Charlotte designated a midway city in the additional Southwest-Northeast service case.

Gulf Aircraft Corp. petition for reconsideration of its request to deny National Airlines temporary exemption to operate helicopter service in the Miami, Fla. area.

Western Air Lines petition for leave to intervene in the Southwest-Northeast service case.

Edgar A. Stewart, doing business as Stewart Air Service, for exemption to operate 25 charter flights between Los Angeles and points in Canada.

Hughes Aircraft Co. petition for leave to intervene in Continental Air Lines application for renewal of its temporary authorization to serve Raton, Socorro, Truth or Consequences, and Las Cruces, N. M.

GRANTED:

North Central Airlines temporary exemption to provide air service to Land O' Lakes, Wis., beginning May 15 rather than June 1 as permitted by its certificate because of the advanced opening of the fishing season.

West Coast Airlines application to omit service at Ellensburg, Wash., on all flights in excess of one roundtrip per day at that point.

Frontier Airlines temporary exemption to provide service between Denver and Pueblo, Colo.

Salt Lake City Corp. and the city chamber of commerce leave to intervene in the matter of the joint application of the City of Ely, Nev., and White Pine County, Nev., to add Ely on United Air Lines route as an alternate intermediate point to Elko, Nev., between Salt Lake City and Reno.

Pan American World Airways permission to inaugurate nonstop service between Shan-

non, Ireland, and Cologne-Dusseldorf, Germany.

Allegheny Airlines permission to use regularly the Philipsburg (Black Moshannon) Airport in serving Bellefonte-State College, Pa.

APPROVED:

Ozark Air Lines change in service pattern to overfly the intermediate points Hannibal, Mo.-Quincy, Ill., Keokuk-Ft. Madison, Burlington, and Muscatine, Iowa, between St. Louis and Davenport-Moline, Ill. on one daily roundtrip provided that Ozark continues serving the intermediate points on one other daily roundtrip.

Intercompany agreements between Capital Airlines and United Air Lines and various other air carriers.

Several rate resolutions adopted at the special meeting of Traffic Conference 1 of the International Air Transport Assn. between Pan American and various other air domestic and foreign air carriers.

DISMISSED:

Petitions of Delta-C&S Air Lines, National Airlines and United Air Lines for intervention in the additional Southwest-Northeast service case.

(May 14-20)

DENIED:

Eastern Air Lines' petition for reconsideration of a 60-day temporary suspension of service at LaGrange, Ga., by Southern Airways.

Twentieth Century Airlines' motion to withhold certain exhibits and oral testimony from public disclosure in the company's current compliance proceeding.

Trans World Airlines' motion to reopen the record of the trans-Atlantic cargo case and European-American Airlines' petition for reconsideration of former order denying EAA's motion to reopen the same case.

Transocean Air Lines' application for an exemption to operate a series of flights between New York and Beirut for transportation of religious pilgrims.

AUTHORIZED:

Alaska Airlines' suspension of service at Akulurak, Alaska, for two years.

GRANTED:

Various cities and chambers of commerce, Air Line Pilots Assn., Air Line Dispatchers Assn., Postmaster General, United Air Lines and Western Air Lines leave to intervene in Southwest Airways Co.'s application for renewal of its certificate.

Pan American World Airways' temporary exemption to operate direct, nonstop flights between Havana, Cuba, and San Salvador, El Salvador, provided that the flights do not serve points on PAA's route south of Tegucigalpa, Honduras.

Trans World Airlines leave to intervene in the Trenton, N. J., service case.

APPROVED:

Intercompany arrangements between Capital Airlines and Braniff Airways and various other air carriers.

DISMISSED:

Laurence B. Conner's application for a certificate of public convenience and necessity authorizing scheduled air transportation of persons, property and mail between Bismarck, N. D., and Phoenix, Ariz., via various intermediate points.

ORDERED:

Braniff Airways to show cause why CAB should not fix the carrier's mail rates.

Amendment of Capital Airlines and Piedmont Aviation routes to redesignate Newport News, Va., as Newport News-Hampton-Warwick, Va.

SHORTLINES

► **American Airlines** has added a third roundtrip nonstop DC-7 flight to its daily service between Los Angeles and New York . . . AA also has added a daily roundtrip aircoach flight between Lockheed Air Terminal at Burbank and New York, with an intermediate stop made in Chicago.

► **Continental Air Lines** flew 12,727,998 revenue passenger-miles in April, a 3.5% gain over April of last year, and the biggest month in the airline's history.

► **North Central Airlines** has hired three stewardesses as the first move in a complete changeover from male to female cabin attendants.

► **Pan American World Airways** figures for the first quarter reveal totals of 450,492,000 passenger-miles and 15,428,400 plane-miles flown, compared with 482,011,000 passenger-miles and 16,059,044 plane-miles in the fourth quarter and 433,835,000 passenger-miles and 15,256,259 plane-miles flown in the first quarter of last year.

► **Southwest Airways** has signed an agreement with Lockheed Aircraft Corp. whereby Southwest will furnish daily commuter service between Burbank and Palmdale, Calif., for employes and business associates of the aircraft manufacturer.

► **KLM Royal Dutch Airlines** will inaugurate once-weekly trans-Atlantic service between Amsterdam and Lima, Peru, June 18, via Curacao.

► **North Central Airlines** carried 19,758 passengers during April for a total of 3,234,339 revenue passenger-miles for a new high for that month: a 13% increase over March and a 20% jump over April of last year.

► **Trans-Texas Airways** showed a 53% increase in passenger carriage last month over April 1953, flying 2,426,618 passenger-miles against 1,589,879 passenger-miles last year.

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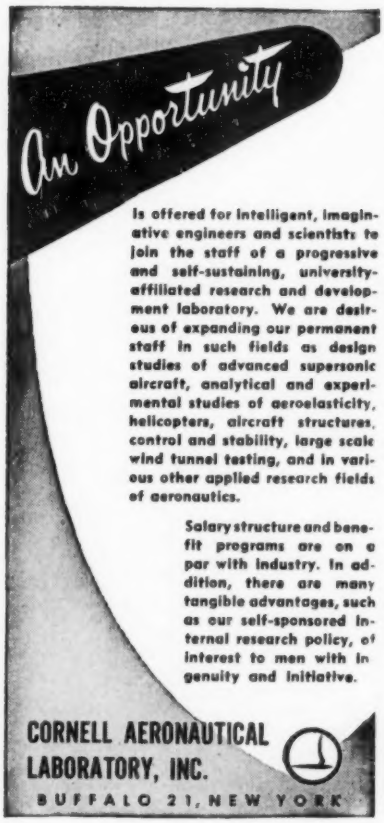

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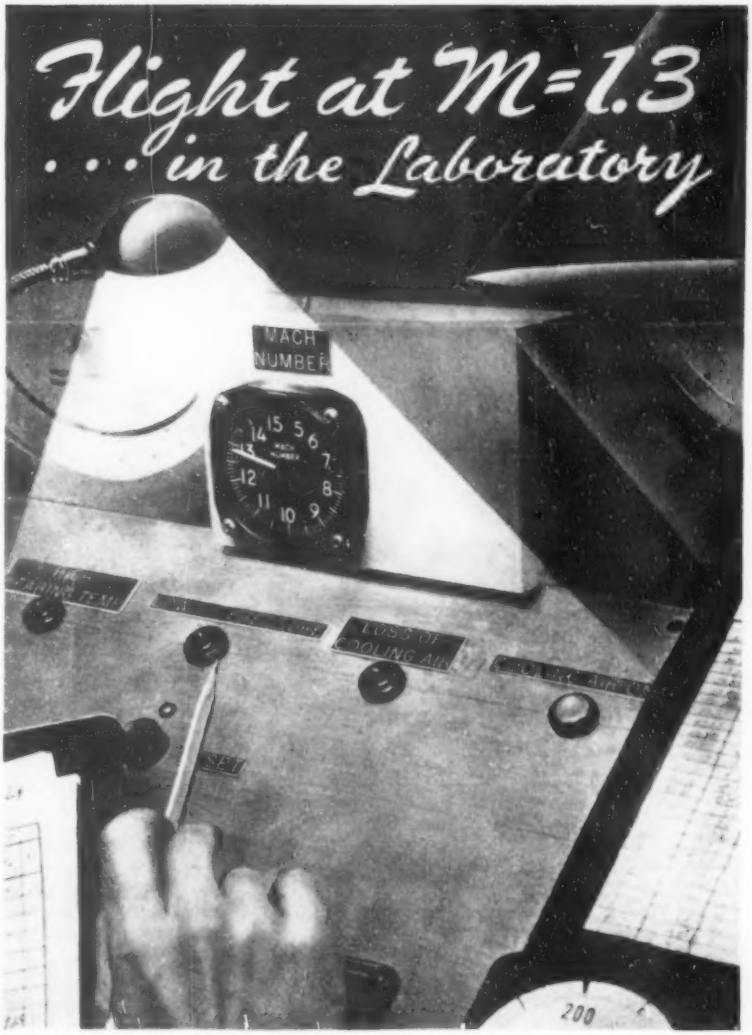

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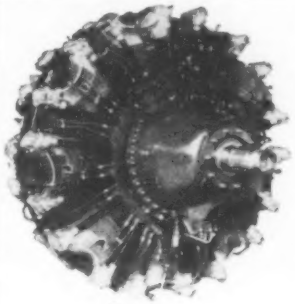

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News Sidelights

Here's the record of the Fairchild Packets during the recent Operation Hushburn: 1,131 sorties, 3,499 takeoffs and landings, 504 airdrop sorties, 627 air landings, 7,049 personnel drops, 2,530 personnel landings, 826 tons of equipment dropped, 2,885 tons landed, 2,043 hr. flying time.

Several Russian engineers, presumably from the Soviet Washington embassy, were in Dayton to attend the recent national airborne electronics conference. AVIATION WEEK's Avionics Editor Phil Klass futilely attempted to get an interview to obtain their views on U. S. developments. Phil did talk with several exhibitors at whose booths the Reds stopped. At the W. L. Maxson exhibit, the Russians viewed our new K-4 tactical bombing computer and picked up literature on a device used in outmoded countermeasures equipment. (Maxson personnel retrieved the literature before the visitors got away.) The Reds ogled the Hughes Aircraft exhibit with its models of the F-102, equipped with Hughes fire control and air-to-air missiles. Several American "engineers," following the Red visitors, seemed more interested in their activities than in the avionic exhibits.

Members of 43 families living near San Fernando Valley Airport in California have filed claims against the city totaling $645,000, charging that low-flying jet aircraft have ruined property values, jarred homes and made residents ill. A similar suit was filed recently against Lockheed Aircraft Corp., asking $1.4 million damages (AVIATION WEEK Apr. 26, p. 21). Meanwhile, Los Angeles Board of Airport Commissioners has announced a plan to protect the approaches to San Fernando Airport by acquiring 50 acres of land in the approach zones to the north and south of the main runway. These would be cleared of residential development. Estimated cost is $1.4 million and the plan depends upon financing under a bond issue.

Flyaway of 29 Sabre jets recently from Los Angeles International Airport marked the largest mass delivery of aircraft to leave North American Aviation since World War 2. Planes went to Clovis, N. M., home of the 388th Fighter-Bomber Wing, where they are scheduled for duty with the reactivated 9th Air Force, Tactical Air Command.

Marine Helicopter Squadron 362, recently on a tour of duty in the Pacific aboard the carrier Bairoko, hung up this operational record with 12 Sikorsky HRS (H-19) copters: days of operation, 116; missions, 2,683; flight hours, 2,453.2; shipboard landings, 3,301; beach landings, 8,030; passengers carried, 17,956; cargo pounds carried, 134,875; aircraft availability, 86%. Safety record: one minor mishap.

MULTI-PURPOSE PLANE developed by AirUtility Cargo Co., North Sacramento, Calif., features a detachable pod concept for carrying different types of payload. Shown here is a pod mockup fitted with four .30-cal. machine guns and four rockets. Other pods would be tailored to carry passengers, airfreight or agricultural chemicals. Designated the AU18-50, production of this plane is planned for "early 1955," will be priced at $15,000, says AirUtility president E. W. Gardenshire. AU18-50 is powered by two 75-hp. Continentals, weighs 1,322 lb. empty, 2,119 lb. loaded. Cruise speed is 125 mph.

AVIATION CALENDAR

May 31-June 11—Canadian International Trade Fair, to be held in conjunction with the National Air Show and Canada's Aviation Day, Toronto.

June 2-4—NACA Lewis Flight Propulsion Laboratory, triennial industry inspection, Cleveland.

June 5—Fifth annual Maintenance and Operation Clinic, sponsored by Reading Aviation Service, Inc., Reading Municipal Airport, Reading, Pa.

June 5-12—Philadelphia Junior Chamber of Commerce, second annual Transcontinental Air Cruise, Philadelphia to Palm Springs, Calif.

June 7-12—Aviation Writers Assn., 1954 convention, Roney Plaza Hotel, Miami Beach, Fla.

June 13-18—American Society for Testing Materials, annual meeting, Hotels Sherman and Morrison, Chicago.

June 16-20—International Tourist Plane Flight, held in conjunction with Fourth Centennial of Sao Paulo, Brazil.

June 17-21—American Institute of Electrical Engineers, summer and Pacific general meeting, Hotel Biltmore, Los Angeles.

June 18-19—Britain's National Air Races, sponsored by Royal Aero Club, Bagington Aerodrome, Coventry, England: International Trophy Race, June 18; King's Cup Air Race, June 19.

June 20-23—Aviation Distributors & Manufacturers Assn., mid-year meeting, Stanley Hotel, Estes Park, Colo.

June 21-24—Institute of the Aeronautical Sciences, annual summer meeting, IAS Building, Los Angeles.

June 23-25—Symposium on Global Communications, sponsored by Institute of Radio Engineers, Statler Hotel, Washington, D. C.

June 24-26—American Helicopter Society, 10th annual forum, Washington, D. C.

July 3-6—Eighth annual All Women Transcontinental Air Race, sponsored by Ninety-Nines, Inc., Long Beach, Calif., to Knoxville, Tenn.

July 3-11—Philadelphia Glider Council, annual Open House Week; Glider Training Camp, June 11-17; both at Hilltown, (Pa.) Gliderport.

July 4—Western national air show & races, including closed-course midget racer events, sanctioned by National Aeronautic Assn., Dansville, N. Y.

July 13-15—Western Plant Maintenance Show, to be managed by Clapp & Poliak, at the Pan-Pacific Auditorium in Los Angeles.

Aug. 7-8—Second annual fly-in and convention, sponsored by Experimental Aircraft Assn., featuring "home built" aircraft, sportplanes, racers, antiques, Milwaukee, Wis., held in conjunction with the fourth annual national air pageant.

Aug. 9-11—Turbine-powered air transportation meeting, Seattle, sponsored by the Institute of the Aeronautical Sciences.

Sept. 4-6—National Aircraft Show, Dayton, Ohio.

Oct. 17-22—International Union of Aviation Insurers, annual general meeting, New York.

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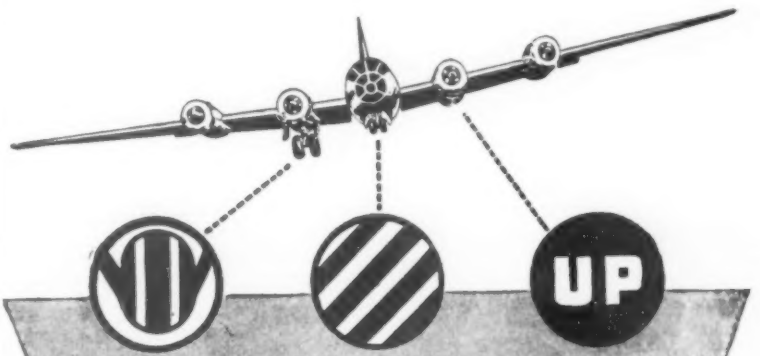

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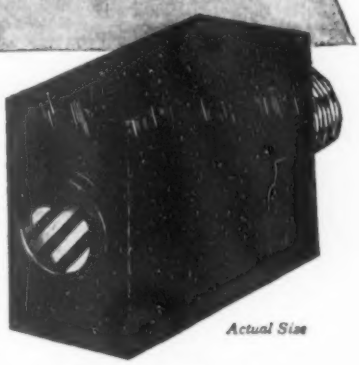

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LETTERS

Australian Air Force

In a just-received copy of AVIATION WEEK there is a letter from a South Australian commenting on the piece which I wrote for you, "RAAF Flies Obsolete Aircraft." He says:

"Your correspondent must be grossly misinformed of the facts, for who would claim the Canberra and Sabre as obsolete?"

Please note that when this piece was originally published, the RAAF did not have one single Sabre and only two Canberras on loan from the RAF.

Also please note that the situation is little changed today. The RAAF has *one* Sabre, which is currently being subjected to experimental modifications. There are less than half a dozen Canberras and less than that available for immediate duty.

The "Australian protests" did not originate with RAAF or with any responsible expert who know only too well that the facts in my piece were perfectly correct.

MARCEL GROBTUCH,
McGraw-Hill World News
Melbourne, Australia

Auxiliary Power

The first thing I read Monday mornings is the Industry Observer column, one of the most interesting features of your very valuable publication.

On Mar. 8 you mentioned that an increasing use of pneumatics to power aircraft auxiliary systems is indicated by Douglas use of a pneumatic system on its YC-124B turboprop Globemaster. This is true for this particular version of the airplane. However, it is our understanding that on the production model, the YC-133, Douglas plans to use a hydraulic differential type of transmission to drive constant-frequency alternators at constant speed. This is one of the major sources of auxiliary power for the new airplane.

The increasing requirements of constant-frequency a.c. power for many of the newer aircraft have dictated the use of a hydromechanical differential-type constant-speed drive for a majority of these new applications.

P. A. ANDERSON, Contracts Manager
Sundstrand Aviation
2421 Eleventh St.
Rockford, Ill.

'Constant Speed'

It is interesting to note that New York Airways reports that vibration is the root of all evil in the helicopter from a maintenance standpoint. The principal vibratory forces originate from the Coriolis effect at the main lifting rotor as was discussed in your Dec. 28 article, which further described how the Coriolis effect was eliminated in the Doman rotor system. To date, this is the only rotor system which has this tremendous advantage.

Inasmuch as the in-plane Coriolis effect is eliminated, the blades of the Doman rotor system, in effect, operate at constant angular velocity. Unfortunately, Mr. William Raser, from his letter published in the Feb. 8 issue, seems to have missed completely the engineering principle described and compares the action of the Doman rotor system with constant speed as brought about by the action of governors. Even in governors there can still be rapid oscillatory fluctuations of angular velocity, while seemingly constant rpm. speed is maintained in a broad sense over a longer time interval. The Doman rotor system is the only system which is designed to eliminate the rapid mechanical oscillatory fluctuations resulting from Coriolis forces and thereby reduces vibrations and the need for maintenance. Constant rpm. speed in the broad sense over the longer time interval can be designed into nearly all rotor systems by any one of many methods and is not the element which is associated with helicopter vibrations.

JOHN W. MAZUR,
Chief Design Engineer
Doman Helicopter, Inc.
Danbury, Conn.

Flight Safety School

We are pleased with the fine coverage you have given our flight safety training program in the Mar. 29 AVIATION WEEK. Basically this article is accurate and provides a good overview of the program.

Prof. James B. Vernon, professor of engineering, who directed preparation of the aeronautical engineering course, was assisted by Prof. Victor J. Martin of the School of Engineering, who collaborated in writing the basic text materials. This material was later revised and almost completely reorganized by Mr. Harrison H. Hurt, our staff engineer and current instructor in engineering. Mr. Hurt deserves particular credit for reworking the technical engineering material into a text which is readily comprehensible to the Air Force officers who have little background in engineering.

Dr. Carl Hancey, Dean of University College, is the administrator of this program, and it was he who was instrumental in making the facilities of the University of Southern California available to the Air Force.

Dr. Paul H. Evans, our flight surgeon, is in charge of the aviation physiology course, while Dr. Warren is the instructor in psychology.

Since publication of this article, the Air Force has extended this training program from six weeks to eight weeks.

LOUIS KAPLAN, Coordinator
Flight Safety Training Program
University of Southern California
3518 University Ave.,
Los Angeles 7, Calif.

Lots of Zeros?

I want to take exception to Stuart Symington's remarks regarding "thousands of Zero fighters prior to World War II" (Feb. 22 issue, p. 13). Mr. Symington has been evidently misinformed on these figures. The truth of the matter is that Japan had produced 444 Zeke fighters up to Dec. 1 of 1941. Mitsubishi had produced all but one of these. The Zeke (A6M-1) II had been accepted in 1939, but failed in carrier tests. Only three prototypes were produced that year. The machine was finally accepted in the summer of 1940 as a carrier fighter and 98 aircraft were produced that year. So actually the Zeke had been in squadron service only a year and could not possibly have been produced by the "thousands." A sum total of 10,934 Zeke Type "O" aircraft were produced from its inception. Mitsu . . . 3,879, Nakajima . . . 6,215. Nakajima also build 323 "Rufes," which was a floatplane version. Hitachi and the 21st Naval Air Depot built 517 Zeke Jrs., which was a two-seated fighter trainer version.

M. A. SALO
8824 So. Songfest Drive
Rivera, Calif.

Praise

The Jet Division wishes to thank you and Irving Stone for your excellent article on our plastic compressor blade development program ("Glass-Plastic Blade Passes 100-Hr. Test," Apr. 5, p. 43). It is very encouraging to all personnel directly concerned with the project to see the results of their endeavor appear in your publication.

R. A. PAETZ,
Chief Engineer,
Jet Division, Thompson Products, Inc.
4583 Beidler Road
Willoughby, Ohio

I want to congratulate you on the splendid article by George Christian on our adaptation of military designs to the requirements of the commercial airlines.

You may be interested in another project we will announce soon—a new approach to the problem of engineer recruitment. We have developed a special engineer recruitment booklet that we believe is more comprehensive and presented more attractively than any we have seen. It is directed not only to the engineer himself but also to his wife and includes a story on the Cleveland area as a desirable place to live and work.

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Cleveland, Ohio

I have read "Plastics Find Wider Use in Tooling Ideas" by Irving Stone in the Mar. 1 AVIATION WEEK (p. 40). . . . May I have reprints, for our library hates to have their books cut up! . . . There is one book that gets read before all others when it comes to my desk, and that is AVIATION WEEK. I thoroughly enjoy it and it is most enlightening.

ARTHUR A. MERRY, Chief,
Advanced Tool Engineering
Pratt & Whitney Aircraft
East Hartford 8, Conn.

(Robert H. Wood, Aviation Week's chief editor, is on United Air Lines' special DC-7 preview press flight from New York to Honolulu. His editorials will be resumed on this page in the next issue.)

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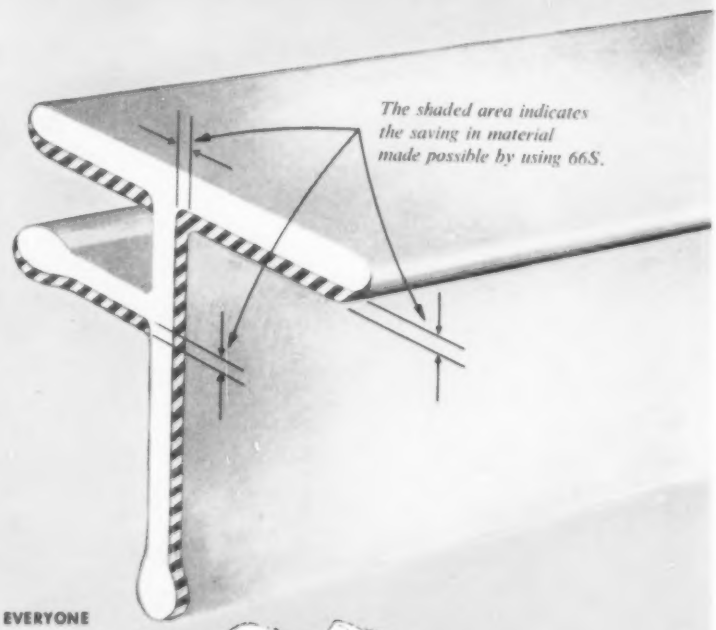
The high yield strength of 66S permits you to reduce the cross section of structural members. This means real dollar savings in material costs. The extrusion below was made of 61S. By using the high yield strength of 66S its cross section is reduced as shown. The saving in material amounts to approximately 26%. Saving in cost, 21%.



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